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Transition To Releases B.0 and B.1

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Abstract

This document presents the analysis of the ECS system transitions from the Pre-Release B SSI&T Testbed through Release B.0 to Release B.1. It discusses the issues that have arisen planning the transitions, makes trade-off analyses, and ultimately will lead to the documentation of detailed plans for transitions at each site.

The objectives, approach, and timescale are presented. The activities at the ECS sites during the transition timeframe are presented. Technical issues arising from changes between the releases are discussed. Trade-offs are made, leading to a statement of some candidate solutions. Transition issues are considered for each subsystem.

The transition from the Pre-Release B SSI&T Testbed to Release B.0 is relatively straightforward, because there is no shared hardware or software, little data to migrate, and the testbed system is not operational. The transition from B.0 to B.1 is more complex: it involves sharing hardware and software with an operational system, and migrating a significant amount of data. Mode management will be used to allow B.1 test and training activities to occur in parallel with B.0 operations.

Updates to this paper will be published as further analysis is completed. See Section 1 for the release schedule.

Keywords: transition, Release B.0, Release B.1, plan, version, migration, mode management.

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1. Introduction

1.1 Purpose

This paper describes the analysis undertaken to date for transitioning the ECS system to new hardware, COTS software, and custom software in the Release B timeframe. Transition is the process of installing, testing, and making operational a new release of custom software, COTS software, and/or hardware. Transition occurs in the interval between the Consent-To-Ship Review (CSR) and the Operations Readiness Review (ORR).

The scope of the plan includes:

1. Transition to Release B.0 at sites that have the ECS SSI&T Pre-Release B Testbed (GSFC, LaRC, EDC, NSIDC, and the SMC).
2. Transition to Release B.1 at sites that have Release B.0 (GSFC, LaRC, EDC, NSIDC, and SMC) and the installation of Release B.1 at sites that do not have the B.0 Release (JPL and ORNL)[1].
3. Hardware and COTS upgrades that occur independently of the B.0 and B.1 Releases.
4. FOS is not in the scope of this study, but integration with the EOC is in scope.

Recent changes being considered which are not yet baselined, such as the replacement of most HP processors with Sun processors, the use of Sun instead of SGI processors for part of Data Server in B.0, and test streamlining, are not addressed in this release of this document.

1.2 Organization

This paper is organized as follows:

- Section 1 - Introduction - Purpose, organization, scope, and review process for this document.
- Section 2 - Timescale for transition, and objectives and approach for transition planning.
- Section 3 - The transition from the testbed to B.0 - a model for the phases of transition from the B.0 Consent-To-Ship Review (CSR) through to B.0 operations.

[1] Note that ASF is not an ECS DAAC in the B.0 or B.1 transition timeframes, per ECS Technical Direction 27, Alaska SAR Facility, 9/3/96.

- Section 4 - The transition from B.0 to B.1 - a model for the phases of transition from the B.1 CSR through to B.1 operations.
- Section 5 - Site Plans - a statement of schedules for the currently planned transition-phase relevant activities and definition of ECS hardware and software at the site during it initial operating time frame.
- Section 6 - Subsystem-Specific Issues - for each subsystem, a discussion of issues, primarily for the B.0 to B.1 transition. Contains a wealth of detail, and can be skipped by readers who want an overview.

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1.3 Transition Planning Timescale

Some of the information presented in this paper, such as schedules and specific physical configurations, is subject to periodic revision. Transition planning will continue through development of the B.1 Release, with further submittals of this paper issued as shown in the following table, to document evolving plans for each site.

Table 1-1. Schedule For Transition Plan

420-TP-010-002	April 96	Delivered for Release B CDR. Contains plans for transition at a generic Release A DAAC and at a generic Release B-only DAAC. Emphasis is on technical issues rather than definition of activities at each site, contention for system resources, or site logistics.
420-TP-010-003	June 96	Updated to incorporate feedback received from CDR and comments on 420-TP-010-002. Includes final hardware-software mapping information for Release A and more detailed information for B. Also includes initial activity plan for each site.
420-TP-010-004	April 97	Updated to reflect the descope of TRMM operations and the replanning of the remaining Release A and B capabilities into three deliveries: a pre-release B Science Software Integration And Test testbed; Release B.0; and Release B.1. Identifies all transition requirements to be implemented in Release B.0.
420-TP-010-005	July 97	Incorporates detailed plans for transition to B.1, together with feedback from DAACs et. al. on individual site transition plans. Identifies all transition requirements to be implemented in Release B.1.
420-TP-010-006	Oct 97	Identifies all testbed to B.0 transition requirements to be implemented by Operations Staff, and further refines details of transition to B.1.
420-TP-010-007	TBD	Further refines details of transition to B.1.

1.4 References

The following documents are referenced within this technical paper, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

102-CD-002-001	Maintenance and Operations Configuration Management Plan
224-CD-001-001	Release B Release Plan for the ECS Project
302-CD-006-001	Release B NSIDC Facility Plan
302-CD-007-001	Release B JPL Facility Plan
305-CD-020-002	Release B SDPS Design Specification Overview
409-CD-002-001	ECS Overall System Acceptance Test Plan For Release B
411-CD-002-001	ECS System Acceptance Test Procedures
416-WP-001-001	Implementation Plan for the Pre-Release B Testbed for the ECS Project
614-CD-001-003	Developed Software Maintenance Plan
620-WP-001-001	Turnover Plan for the ECS Project
800-TP-007-001	EDC Release B Installation Plan (First Procurement) for the ECS Project
800-WP-002-001	Facilities Plan For Release B For the ECS Project

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2. Transition Timeframe and Objectives

2.1 Functional Overview

The Pre-Release B Testbed allows early Science Software Integration and Test (SSI&T) for AM-1 and SAGE III. The testbed can integrate science software into ECS and execute the SSI&T tools. It allows the Instrument Team(IT) user to create, activate, and delete data production plans including plans with basic rules, schedule data production test runs, process routine data production requests, and store and retrieve science data. A detailed list of testbed functionality is in the *Implementation Plan for the Pre-Release B Testbed for the ECS Project* (416-WP 001-001). The testbed will be installed at GSFC, LaRC, EDC, and NSIDC on its own set of hardware. It will become operational in May 1997 at GSFC and LaRC and in June at EDC and NSIDC and will run until Release B.0 is operational.

Table 2-1 summarizes the sites and mission objectives of Releases B.0 and B.1.

Table 2.1. Missions Objectives and Sites Supported

Release B.0, 12/30/97		Release B.1, 9/1/98	
Sites	**Mission Objectives**	**Sites**	**Mission Objectives**
EDC DAAC GSFC DAAC LaRC DAAC NSIDC DAAC SMC	Support AM-1 Operations Support Landsat-7 Operations Support SAGE III Operations Science Data Processing Support DAS Archive Requirements	EDC DAAC GSFC DAAC LaRC DAAC NSIDC DAAC JPL DAAC ORNL DAAC CIESIN SEDAC SMC	Support AM-1 Operations Support Landsat-7 Operations Support SAGE III Operations Science Data Processing Support ADEOS II Operations Support DAS Access To Ancillary Data

The *Release B Release Plan for the ECS Project* (224-CD-001-001), Table 4-1, presents an overview of the Release B.0 and B.1 functional capabilities by subsystem. The following paragraphs give an overview of the differences.

Release B.0 provides launch critical functionality for AM-1, SAGE III and Landsat 7. This includes an SSI&T environment, Product Generation Executable(PGE) incorporation, local production planning with production rules, ingest of Level 0 data and ancillary production data by polling and automated network, local insert, creation of Level 1A and 1B data, search, order, browse, acquire, remote acquire, search of multitype collections and multistate granules, scene selection of Landsat 7 and subsetting some MODIS data for production only, ASTER DAR support, keyword and full text search of text documents by COTS software, order status checking for an entire order, standing order capability, DAAC monitor and control of processing distribution requests, and DAAC management reports. The Data Assimilation System (DAS) will be supported with general ECS capabilities.

Release B.0 and the testbed run on separate and somewhat different sets of hardware and COTS software**.** They are on separate networks connected through Ebnet and the NASA Science Internet (NSI). B.0 software will be installed at GSFC for formal verification testing in June 1997 and at LaRC, EDC, and NSIDC in October 1997. Release Readiness Review (RRR) for all installations is in December 1997.

Release B.1 provides full ECS Release B functionality. This includes full product generation, on demand processing, subsetting, tailored document storage and retrieval, inter-DAAC production planning, on demand production processing, remote inserts, full client, granule level request tracking, partial order distribution, order segmentation, subsetting, Earth Science Query Language(ESQL) support allowing coincident and incremental search, data dictionary with advertising services, subscriptions, management accounting, billing services, data server proxy and advanced exit handling.

Release B.1 software will run on the same hardware string as Release B.0. There will be upgrades to the hardware at the DAACs from November 1997 through January 1998, but those upgrades are not tied to the transition to Release B.1. B.1 software installation is scheduled for June-July 1998 at the B.0 DAACs and June 1998 at JPL and ORNL. RRR for all DAACs is in September 1998.

2.2 Transition Timeframe

The testbed to Release B.0 transition takes place from January to March 1998 with testbed termination planned for April 3, 1998. The Release B.0 to B.1 transition takes place between October and December 1998 with Release B.0 termination on January 6, 1999. Figure 2-1 provides an overview of the activities from the present until B.1 is operational across the ECS sites. A more detailed schedule for each site is in Section 5.

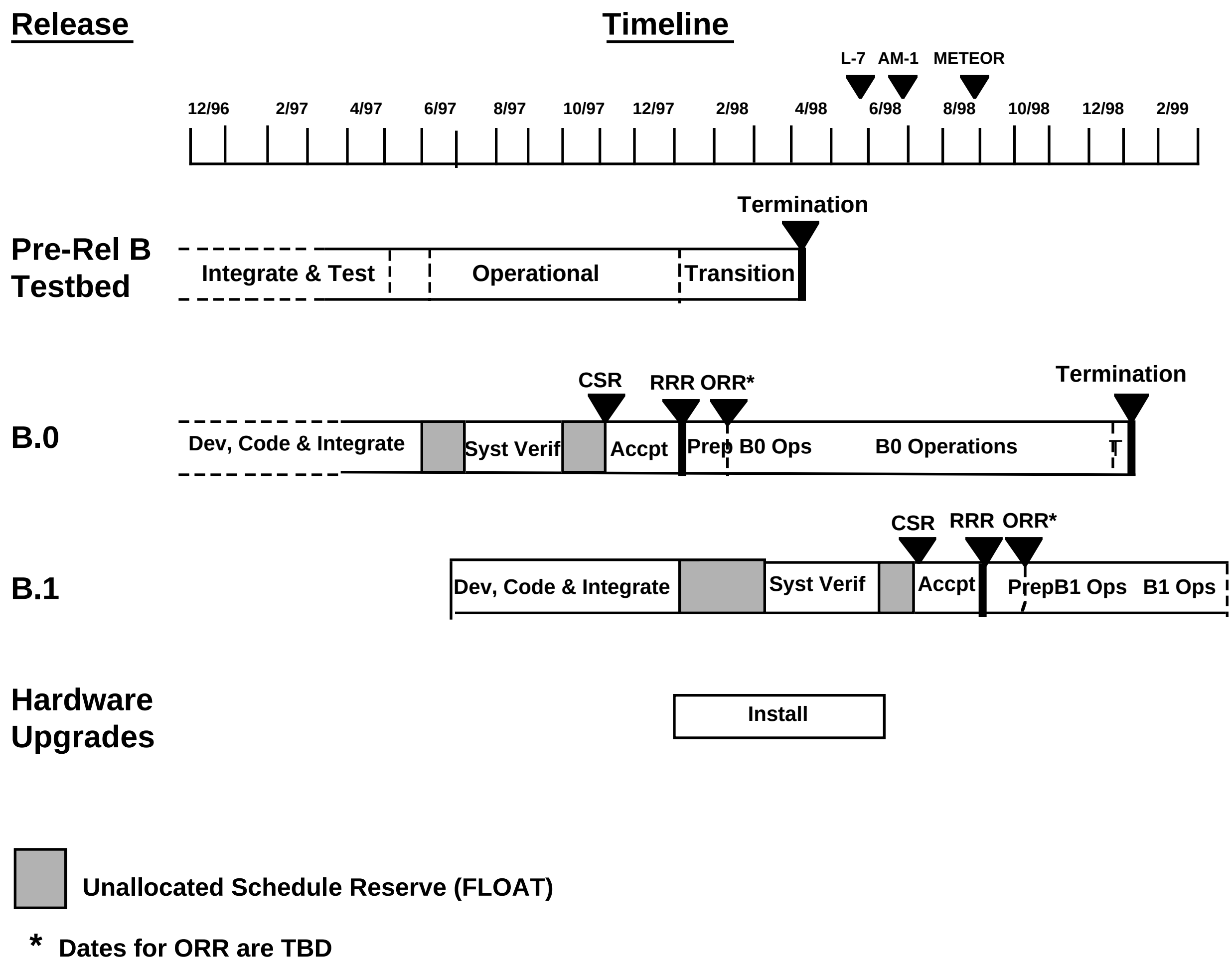

Figure 2-1. Transition Timeframe Activities

2.3 Objectives

Objectives for transition from the Pre-Release B Testbed to Release B.0, and for Release B.0 to Release B.1, are the same:

- For the old release, minimize the perturbation to ongoing SSI&T/operational activities.
- For the new release, ensure the availability of hardware, software, and DAAC resources (personnel, floor space, power, preparatory materials) needed to install, configure, test, train, accept, and activate.

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3. Transition from Testbed to Release B.0

This section describes the transition from the Pre-Release B Testbed to Release B.0 at the DAACs. GSFC, LaRC, EDC, NSIDC and the SMC are the operational DAACs for Release B.0.

3.1 Assumptions

At each site, the testbed and Release B.0 hardware strings comprise independent sets of hardware with no direct connection.

Release B.0 is the first operational release of ECS. No scientific data, production planning schedules, user requests, request completions awaiting delivery, subscriptions, advertisements, documents, or other database contents will be taken from the testbed and inserted into Release B.0.

Earth Science Data Types (ESDTs) must be compatible with the B.0 data model. New B.0 version ESDTs will be supplied by the Science and Data Engineering Office(SDE). (See discussion below.)

PGEs must be compatible with the B.0 data model and B.0 Toolkit. New PGEs for B.0 will be supplied by the ITs. (See discussion below.)

No V0 data will be migrated from the testbed to Release B.0.

3.2 Approach

Since there are no known major items to transition from the testbed to the B.0 system and the B.0 system runs on its own hardware string, transitioning to B.0 follows the steps of bringing up a new system. The installed configuration must be verified, databases and other components initialized, supplies put in place, user preparation made, and personnel familiarized with the system.

3.3 Activities

3.3.1 Activities Leading to RRR

Release Installation

Release B.0 activities begin at GSFC with system verification testing dry runs in April, 1997 and formal verification in June. CSR on October 31, 1997 marks the beginning of Acceptance Testing. For testing, ECS Release B.0 software will be installed at each DAAC. At GSFC, the completion of Formal System Verification and Acceptance Test Dry Runs will overlap. The Testing Group will need to coordinate the application of fixes through Project Configuration Management(CM).

The process for CM of multiple releases at the DAACs will be similar throughout the system life cycle. Mode management will be used. Briefly, mode management is the process by which several versions of software can be executed at the same time without them affecting each other in the product sense and with multiple modes clearly identifiable within the system. An operator can monitor each mode separately. The Appendix contains a mode management primer. Mode management will be used to run the different versions of the software for testing, training, and/or simulations in the Release B.0 time frame. The procedures for the use of mode management will be detailed in the Release B.0 Mission Operations Procedures Data Item Description(DID) 611 when it is published.

The main principle of the CM process is to create separate baselines that will be used to control the different versions. ClearCase and XRP II Baseline Manager will be used to maintain the different baselines. The test and operational baselines will be created and managed by the Sustaining Engineering Organization(SEO) CM organization. The directory structure and naming conventions will follow the conventions that are detailed in the ECS Project Instruction (PI) CM-1-023. This convention facilitates the use of the ECS extended configuration identification. It allows for easy identification and control of different versions of software and data. The CM plan is detailed in the *Maintenance and Operations Configuration Management Plan* (102-CD-002-001) and CM procedures are in the *Developed Software Maintenance Plan* (614-CD-001-003) and will be in DID 611.

In future releases, the new release of software will be installed under a test mode and promoted to the production mode at transition time. However since B.0 is the first release on the Release B hardware, it will be installed directly into the production mode directories (and also into other modes as necessary).

There may be some mode management limitations in the B.0 software for the B.0 to B.1 transition. These limitations will be made up by manual mode management and resource scheduling. This may require bringing down the system, installing the new software for testing and then backing out the new version in case of problems. See the discussion of mode management in Section 4 for more information.

Procedures that will be used in operating Release B.0 will be specified in DID 611. The volumes of this document will contain operators procedures for each DAAC, SEO procedures for maintenance releases, and SMC procedures for software delivery and installation coordination. Below are some of the topics to be covered.

System Administration - This set of procedures will include detailed procedures and instructions that describe performing system backups, system restores, DCE cell configuration, installing and upgrading hardware, installing custom software, installing and upgrading COTS software, license management, system startup and shutdown, and log maintenance.

Database Administration - This set of procedures will include detailed procedures and instructions that describe product installation and disk storage management, configuration of the SQL server, database user administration, database integrity checks, backup and recovery, data migration, changing schema, and standard trouble shooting procedures.

Network Administration - This set of procedures will include procedures for adding any new nodes that may be required, adding network objects, adding segment objects, adding IP interface objects, and configuring HP OpenView to recognize the new system and to monitor it.

System Monitoring - This set of procedures will include procedures that will describe how an operator will be able to monitor operations, testing and training activities.

Problem Management - These procedures will detail the procedures and instructions that involve the generation of trouble tickets, the trouble ticket review process, and the generation of CCRs.

Configuration Management - This set of procedures will detail the procedures and instructions that include creating a new baseline, updating a baseline, configuring software using ClearCase, conducting configuration audits, processing CCRs, software transfer and installation, software/baseline promotions, document control, and configuration of science software.

Mode Management - This set of procedures will detail the procedures and instructions needed for configuring the systems and software for the different modes, operation of the system in the different modes, and the monitoring of the system in the different modes.

Resource Planning - This set of procedures will detail the procedures and instructions needed to create a resource plan, update an existing plan, and update the resource list.

Database Initialization and Population

ECS has a number of databases and tables which must be created at system startup. Table 3-1 lists the production databases in Release B.0 and describes how the tables will be populated after they are created. These databases will be created during testing. At RRR they most likely will contain test data or synthetic data so the table contents must be reinitialized.

Table 3-1. Release B.0 Production Databases

Database	Content	Initialization
Ingest DB	File types to be ingested, status of ingest production requests, historical summary.	Load entries for 100-200 data types with SQL scripts developed by Ingest developers
PDPS	PGE information to plan production	Install PGEs during SSI&T with GUI tool
Metadata	Collection, granule, document, producer, and other descriptive information about science data	Install approximately 545 ESDTs with GUI tool
MSS Management Database	System and application performance information, user profiles, and order tracking information	DAAC personnel insert user profiles in database Others TBD
Storage Management Pull Monitor	Staging disk usage, tape drives available, requests needing resources	Drive information comes from server startup
Data Dictionary	User descriptions of attributes and other terms in system	Load model attributes with scripts
Document Database (WEB based search only)	ECS-related science documents	DAAC personnel copy documents to directory
ASTER Lookup Table(LUT)	Atmospheric correction parameters	U.S. ASTER IT supplied tape to be loaded at EDC DAAC
CSS Persistent Access Control List (ACL)	List of principals who can access components	DAAC operator manually fills ACL with GUI to associate groups with authorizations
Advertising Database	Holdings and services available to users	One initial entry to identify site - Rest populated automatically as ESDTs are installed in DSS or Ads are provided by users
Subscription Database	Principals (users or servers) to be notified when a specified event occurs	Empty at startup - fill from SDSRV and other event producers. DAAC operator manually enters subscriptions in B.0

Table 3-2 identifies the tools that have information or databases needed to manage the ECS system.

Table 3-2. Release B.0 System Management Databases

Application	Tool	Server
Network Management	HP OpenView	MSS Server
System Performance Management	Tivoli TME/Sentry	MSS Server
Extensible SNMP Agent	Peer Networks Optima	All platforms
Trouble Ticketing	Remedy Corp. ARS	MSS Server
Physical Configuration Management	Accugraph Corp. (PNM)	MSS Server
Security/DCE Management	HAL DCE Cell Manager	CSS Server
Software Change Management	Clearcase	CM Server
Change Request Management	DDTS	CM Server
Baseline Manager	HTG XRP	CM Server

ESDT and PGE Issues

The Metadata database must contain a definition of each data type ECS will create, process, or archive. An ESDT is the source of this definition. There must be science software which generates each product ECS will create and knowledge of how to execute that software. A PGE executes the science software to produce a product. The PGE information is in the PDPS database. The following gives an overview of ESDT and PGE issues.

An ESDT defines the attributes and services for a particular type of data used in ECS. An ESDT must be registered for each type of science data the system will process. An ESDT consists of a descriptor file and a Dynamic Link Library(DLL). The descriptor file specifies the collection level attributes, granule level attributes, list of services available for the data type and the events for the collection. The DLL contains C++ code to provide information about a specific ESDT to the generic Computer Science Data Type (CSDT) services routines so that generic service routines can be used for operations such as INSERT, ACQUIRE, UPDATEMETADATA, SUBSCRIBE, and SUBSET for all products. Data Server also provides more complex operations like collecting multiple files received at different times into one granule.

The external user services vary with the release and the ESDT must match the external services available for it. The DLL code for services such as subsetting, subsampling, and other complex operations may require custom development. The first appearance of these complex services is at Release B.1 except for Landsat scene selection and some MODIS production subsetting. Many ESDTs are for internal use with ECS, often for transitioning from one PGE to another, and do not require external user services.

The descriptor file and DLL are created by SDE up to RRR. (Responsibility for ESDT development after RRR could reside with SDE or with Maintenance and Operations(M&O).) SDE plans to make the modifications, including testbed to B.0 data model related changes, needed in the Descriptor and DLL files to create Release B.0 ESDTs. The Meta-Data WORKS tool (replacement for M_POP) will be used to build B.0 descriptor files. An automated development and maintenance tool for ESDTs is a B.1 deliverable.

Once Release B.0 ESDTs are developed, they must be registered with ECS during SSI&T using a GUI tool. This must take place before any PGEs needing the ESDT can be run.

A PGE is normally a script which executes one or more programs to process science data to create a product to be archived in ECS. PGEs are supplied by the ITs and run by the Data Processing Subsystem(DPS). The ITs develop three different versions of a PGE as the code matures through testing: 1) an early testing or Beta version, 2) an Engineering version, or Version 1, and 3) an operational, Launch Ready version, or Version 2. The versions prior to the Launch Ready code allow the ITs to test the PGEs with the SDP Toolkit in the DAAC Integration and Test environment and get performance estimates. They then make code refinements prior to delivery of the Launch Ready version, due six to nine months before launch.

The ITs will redeliver their PGEs for Release B.0 to match the B.0 data model. They can not run the testbed version of the PGEs with Release B.0 and there is no transition of PGEs between the testbed and Release B.0.

The IT's PGEs are delivered as a tar file which includes the PGE script, source code, executables, and test data. The DAAC staff, IT representatives, and SDE liaisons perform software integration and test on the PGEs after they are delivered. SSI&T for a single PGE takes about four days. SSI&T for an instrument's such as MODIS entire set of PGEs could take up to 60 days.

A PGE and its associated production rules are entered into the PDPS database using an SSI&T tool. The PGE and all its related ESDTs must be entered before it can be run.

Translation/Installation Of Scripts and Other Software

There will be no direct network connection between the testbed and the B.0 system. This prevents any interference between the systems, for example from runaway data flows, and eliminates any potential for namespace conflicts. It also prevents testbed users gaining access to the B.0 system. Indirect connections exist through EBnet and NSI, but it will be possible for the network administrator to control access between the systems by adjusting the filters in the B.0 routers to include or exclude testbed addresses, or (for example) to allow Simple Network Management Protocol(SNMP) traffic but not Remote Procedures Calls(RPCs). Therefore, it will be possible, when the filters are open, to move files between the systems via standard tools such as ftp. The following summarizes the policy for traffic between the systems: *Router filters will,* *initially, disallow all traffic between the testbed and the B.0 string. Only during authorized migration of data from the testbed to B.0 will the network administrator open the filters.*

There may be some site-developed software not identified in this document that requires porting from the testbed to B.0. The software may require significant changes when porting from testbed to B.0 for the following reasons:

1) The operating systems and COTS products are newer versions. Some components may be hosted on platforms from different vendors.

2) With the introduction of mode management in B.0, sites need to be aware that when software connects to a resource (like a database or a server), they must make sure that the connection is to the correct resource for the mode. An example of site-developed software that needs to be mode-aware is a script that executes queries on a Sybase database; the script must connect to the database instance corresponding to the mode. The script could get the mode from a command-line argument, environment variable, or configuration file.

3) DCE cell names will change during transition to B.0, and the DCE Central Directory Service (CDS) directory structure also changes for B.0.

4) The top of the ECS Unix file system path changes from /usr/ecs/rel_A to /usr/ecs/<mode>.

Additional issues not currently recognized may also arise.

Acceptance Testing

B.0 Acceptance Testing dry runs start in August 1997 at GSFC. Formal acceptance testing will be in November and December 1997 at all sites. The Acceptance Test procedures and test data needed are being developed. The Acceptance Test dry runs will run in parallel with formal verification tests and plans must be laid for a smooth operation. Acceptance Testing ends with RRR, and the system is then certified to meet requirements. After RRR, the system and software maintenance are the responsibility of M&O. The system will support SSI&T and ECS Ground System(EGS) integration and test until launch.

Training

Training plans and training materials for the ECS system are being documented in DID 622 and DID 625, respectively. DID 625 will be ready in October, 1997. COTS training for site personnel is underway. ECS training will begin in Fall 1997.

3.3.2 Post RRR Activities

System State at End of RRR

At the end of acceptance testing the following conditions will exist:

- The hardware configuration, COTS, and custom software have been audited and baselined.
- The latest version of ECS software is installed and under baselined CM control.
- Outstanding Nonconformance Reports (NCRs) exist.
- All configuration files are established.
- All ESDTs delivered at CSR have been installed.
- All databases have been created and initialized for testing purposes and may contain test data.
- Most likely, only synthetic PGEs exist in the system.
- User accounts for DAAC and test personnel have been established. User accounts for ITs and the end-user community are not established.
- Preliminary training of DAAC personnel has taken place.
- A preliminary copy of the DAAC Operations Procedures has been delivered.

Operational Readiness Activities

Formal operational readiness activities begin at the end of RRR, but some tasks may be performed before then. The activities confirm the operational readiness of hardware and software, operational procedures, human interfaces, and operational M&O databases. Among the many tasks to be completed are:

- Personnel are trained and certified.
- Operational procedures and instructions are reviewed at each site for accuracy and completeness.
- Logistical and third party maintenance support are verified.
- NCRs are evaluated; some are given to SEO as trouble tickets, some are given to development for resolution, and some are rejected.
- Operational databases are initialized and brought online. Test data is placed away from the operational environment.
- SEO assumes responsibility for maintenance of the system.

- Liens associated with the configuration are worked off.
- M&O picks up configuration responsibility for each site.
- Site SDL librarians establish science software libraries and other non ECS software libraries.
- The operational performance characteristics at each site are determined.

The transition from the Pre-Release B Testbed to Release B.0 at GSFC, LaRC, EDC, NSIDC, and SMC will be supported by the current DAAC M&O staff at each site, supplemented by M&O personnel at the EDF. The actual numbers for M&O staffing are still under negotiation with NASA at the time of this writing. However, the current plans are to support the transition just as if it were a normal maintenance release. In other words there is no plan to add additional staff for these transitions.

Operational Readiness preparation includes running a set of exercises which verify DAAC functionality and interfaces, ECS user connectivity, ECS system functionality and internal interfaces, and ECS external interfaces. These exercises are being written by DAAC government and M&O personnel. The tests could take 10 days or more to run. The total operational readiness period lasts longer. The operational readiness plan is being documented in DID 603 which will be completed in October 1997.

The Operational Readiness Review(ORR) conducted at the completion of the exercises confirms the following:

- All site operational readiness exercises are completed.
- All ECS system operational readiness exercises are completed.
- External interfaces have been verified.
- User accessibility has been verified at site and system level.
- No critical trouble tickets are outstanding.
- All positions are staffed with certified staff.
- Operational databases are initialized and synchronized within each DAAC.

At the completion of this review, the DAAC is certified ready for operation. The final decision to go operational rests with the DAAC manager. The DAACs do not need to synchronize the date on which they go operational, but cross-DAAC ACQUIRE will not be possible until the remote DAAC is running.

Discrepancy Workoff

SEO will be responsible for seeing that trouble tickets get worked off.

Terminate Testbed

SSI&T users developing and testing algorithms and PGEs on the testbed must be transitioned to Release B.0. The ITs will need to make any modifications to their software to run under the B.0 system, such as accommodating data model changes, before they can do SSI&T under B.0. The schedule for receipt of new B.0 PGEs is yet to be developed. The ECS schedule shows B.0 RRR on December 30, 1997 with testbed shutdown on April 3, 1998. A detailed plan to transition users off the testbed in this timeframe is necessary. Responsibility for developing this plan needs to be established by EGS.

3.4 Risks

As the first operational release of ECS, B.0 runs the normal risks of new system startup. These include hardware failure, new software and environment for DAAC personnel, software performance problems, and unanticipated system interactions. However, there are no risks from disturbing a previous operational ECS system, sharing hardware, or transitioning large amounts of data.

4. Transition to Release B.1

This section describes the transition process that begins with the installation of B.1 software following CSR, and results in the ECS enterprise being operational with the B.1 Release at the GSFC, LaRC, EDC, NSIDC, JPL, and ORNL DAACs, and the SMC Center. Note that JPL and ORNL are not B.0 DAACs, so their transition is simpler. The JPL DAAC (which is a full ECS system while ORNL is a hybrid system) may be a valuable resource for B.1 testing, since the hardware will not be shared with B.0 operations. Note that acceptance testing occurs to the maximum extent possible at the mini-DAAC at Hughes in Landover, but JPL could participate by supporting cross-DAAC tests.

This version of this paper does not present a final approach to transition from B.0 to B.1. In fact, it is impossible to reach an end-state solution while schedules, processes (test streamlining), and hardware diagrams are changing. However it is necessary at this time to determine all requirements for transition to B.1 that must be implemented in B.0; for example, mode management. The next release of this paper will identify all requirements for transition that must be implemented in B.1; for example, backward compatibility. A further release will identify details of operations staff responsibilities for transition.

4.1 Assumptions

1) There is no requirement to support parallel operations, with both B.0 and B.1 supporting operational activities at the same time. There is no requirement to do parallel maintenance of databases in the B.0 and B.1 systems. As a general model, the proposed approach is to initially install a snapshot of all or part of B.0's data into B.1 to support test and training, and then to refresh the data periodically until transition is complete.

2) There is no requirement to support reverting to B.0 once B.1 is in production. Although backups of the state of B.0 at switchover will be kept, to revert after B.1 has been in production will require B.0 to be brought up to date by means of either a reverse migration of data (requiring scripts to be developed to convert from new schema to old schema), or re-ingesting data and re-creating products. After even a short period of operation, such regression will be impractical.

3) Verification that the system meets the Level 3 requirements will happen in the Verification And Acceptance Testing (VAT) mini-DAAC at Hughes in Landover, to the maximum extent possible. This will include cooperative cross-DAAC testing with a B.0 DAAC. Following system verification testing in the VAT mini-DAAC, on-site testing at the DAACs consists of only:

   a) Core Confidence Tests - startup, shutdown, M&O procedures, databases, security

   b) Site-Unique Tests - tests of site-unique interfaces, for example, and end-to-end tests such as a day in the life of the site.

4) There will be some data model changes for B.1, probably causing ESDTs to need modification.

5) Each DAAC will be fully staffed. Staffing will be a matter of resource scheduling between that DAAC's staff, SEO, and EDF M&O.

6) The system infrastructure will not change between B.0 and B.1 to the extent that mode management of B.0 and B.1 running in parallel would be impossible. The system infrastructure includes:

   - the operating systems and DCE services
   - the DCE cell configuration
   - the management framework (HP OpenView, Tivoli, SNMP, the management agents, the mode management service, and system management COTS)
   - the archive service (the AMASS COTS and the archive robotics).

4.2. Approach

4.2.1. Parallel Operations and Test

Unlike the transition to B.0, which used separate hardware strings for the testbed and B.0 systems, the transition of the B.0 DAACs to B.1 is currently planned as an upgrade of the system in place, without another hardware string. However, the transition model shown below requires significant use of the system for acceptance testing, training, database migration, and so on. The options for dealing with this resource contention at the B.0 DAACs are as follows:

Option 1: Use Production Downtime

Making use of downtime is an inexpensive approach but would require changes in current plans.

- The transition schedule assumes that testers and trainers can have interference-free access to the system. This would be unlikely if test and production sessions were interleaved, since some reconfiguration would be needed before and after test sessions.
- Using downtime for transition activities like testing obviously requires that production is not a full-time activity. However current plans are for 7x24 use (24 hours a day, 7 days a week) at the busier DAACs after AM-1 and Landsat-7 launch; see table 4-1 Hours Of Operations. If the schedule were to change such that transition to B.1 could occur, at all sites, prior to the AM-1/Landsat-7 processing load, then downtime would be viable.
- The hours shown in table 4-1 are for ingest and production, the "push" side of the system. The "pull" side stays up whenever possible to support users, so users would lose service when transition activities were in progress. However, it is expected that pull-side users can tolerate the system being unavailable for up to 24 hours if the outage is well publicized, while Landsat-7 cannot tolerate an ECS outage of more than a few hours without losing data. Therefore, if a standalone Ingest capability were provided to ingest and cache incoming data for later archival, occasional outages of up to a day could be planned.

The conclusion is that while significant amounts of downtime are not viable at the busier DAACs, outages on the order of half a day every few days are possible, without loss of data, if a standalone Ingest capability is left running.

Table 4-1. Site Hours of Operations

Hours Of Operations			
Starting On			
	Dec-97	**Mar-98**	**May-98**
Site	Rel B.0 RRR	L-7 and AM-1 L-3 Mo.	L-7 and AM-1 Launch
SMC	24 hrs/day	24 hrs/day	24 hrs/day
	7 days/week	7 days/week	7 days/week
EDC	8 hrs/day	16 hrs/day	24 hrs/day
	5 days/week	7 days/week	7 days/week
GSFC	8 hrs/day	8 hrs/day	24 hrs/day
Prime Shift	7 days/week	7 days/week	7 days/week
Other	16 hrs/day	16 hrs/day	
Shifts	5 days/week	5 days/week	
LaRC	16 hrs/day	16 hrs/day	24 hrs/day
	7 days/week	7 days/week	7 days/week
NSIDC	8 hrs/day	8 hrs/day	8 hrs/day
	5 days/week	5 days/week	7 days/week

Option 2: Mode Management

Mode Management is the capability to run multiple versions of software in parallel on a single hardware string. See the appendix for an overview of the mode management capability. Mode management is the long-term solution for testing new releases of software without halting production, and mode management will be used during development of the Release B software to allow build iterations to be tested in parallel; however, there are some limitations associated with using it for transition to B.1:

1. Some activities cannot run in parallel under mode management:

   a) When a resource cannot be shared. For example, external interfaces probably cannot be used by more than one mode at a time, since external systems generally do not support multiple modes.

   b) When the new release changes the infrastructure (see section 4.1 for a definition of the infrastructure), since infrastructure code must present interfaces that are compatible with both releases. If B.1 were to change a shared interface, it could not run as a mode in parallel with B.0. Consequently, B.1 infrastructure interfaces will be made backward compatible with B.0. If an incompatibility does arise, B.0 will have to be patched to bring it up to the B.1 version of the interface.

c) When, for realism, the new release is finally tested running in production mode. This will require at least a brief outage of B.0 production.

2. Running test and training in parallel with production obviously requires additional system resources when compared to the needs of production alone. However, even after Landsat-7 and AM-1 launch it is not expected that the system will be operating near full capacity, so the unused system capacity will be available for test and training modes. Some transition activities, such as performance testing, will exert significant loads on the system, to the detriment of operations: the performance test scenarios are discussed in the phase 4 Acceptance Testing section below.

3. Test and training modes will inevitably increase the chances of system failures. However the risk can be reduced by allocating the test and training modes to machines that are not being used for production, since almost every machine has a spare backup. In the event that a production machine failure occurs, the test/training modes would have to give up the backup machine. The test/training modes will then either have to get by with one less machine, or share a machine with production, if production is willing and there are no problems with co-residency of COTS products.

4. Testers' schedules assume interference-free access to the system; the schedule does not allow for sharing with production or any other modes. Note though that B.1 verification and acceptance testing will be carried out to the maximum extent possible at the Verification And Acceptance Testing (VAT) mini-DAAC at Hughes in Landover, before moving to the sites, in order to minimize interference.

The conclusion is that mode management will be capable of supporting many, but not all, test and training activities in parallel with production. Other options will have to be used for activities like failover testing or performance testing, at the sites that have B.0.

Option 3: Build Another Hardware String For B.1

This option would provide a separate hardware system to support B.1, so that testers and trainers could have interference-free access to the B.1 string while operations progresses on the B.0 string. Following ORR, the B.1 string would become the operational system while the B.0 string would eventually be terminated.

Where could the hardware to build this second string come from? One option is to use the site's cold spares, although obviously there will then be a problem if a failure in the production system calls for some of the spares during the transition period. The site's stock of cold spares would be replaced from the B.0 string, when it is finally taken down.

The other option is to buy hardware (perhaps by accelerating future purchases) to upgrade the testbed equipment at GSFC and LaRC to provide a second environment at those DAACs for the integration, test, and transition to the B.1 software. Additional hardware would also be required at the other active B.0 DAACs (EDC and NSIDC), unless operations downtime is more readily available at those sites. Also, it is not clear whether the NSIDC DAAC could support the additional equipment required for a second string within its current physical plant.

Conclusion

Mode management is the preferred method for supporting test and training activities for B.1, in parallel with B.0 operations. For activities such as Ingest from an external source where it is not possible to run two modes in parallel, the choices are:

1) Temporary outages of part or all of the system while test/training activities are in progress

2) Use of the cold spare stocks, and/or early purchase of hardware, to build a second string.

We are continuing to explore how these options could support external interface tests and verification and acceptance tests, including what testing requirements need to be met.

4.2.2. Evolutionary Versus All-At-Once Transition

The B.1 software will be developed to support restricted interoperability with specific B.0 interfaces and data formats, so that it will be possible to cutover individual B.1 subsystems into the B.0 system. For example the B.1 Ingest subsystem might be cutover into B.0, followed by the B.1.Data Server subsystem, followed by the rest of the system. Data Server would need to be backward compatible with all its clients, but the B.1 versions of those clients would not need to support backward compatibility since their B.1 versions would never be in a system with a B.0 Data Server.

While a specific evolutionary (also known as “piecemeal”) strategy has not been decided, a low-risk incremental approach is sufficiently attractive that the following requirements for backward compatibility will be levied on B.1 subsystem interfaces:

1. All public interfaces for B.1 software CI's shall be backwards compatible with B.0 public interfaces. This means that any public interface changes in B.1 must be implemented as additional interfaces and the original B.0 interfaces must continue to be supported. Specifically:

   - Methods can be added to API classes but existing methods should not be changed or deleted

   - Method parameters should not be changed or deleted

   - Method parameters that are added for B.1 should be at the end of the signature, and should be defaulted if not used by B.0.

2. Backwards compatibility shall be supported for all cross-CI data flows (e.g., data formats, URs, granules, and files that are passed between CIs).

3. The following new level 4 requirement will be added to each software CI: "Each new release of the CI shall provide public interfaces that are backwards compatible with the previous release".

Backward compatibility will also help to decouple the transitions of ECS sites, so that the whole of ECS will not have to transition at the same time.

An evolutionary transition will require the agreement of all parties that production can run in interim configurations that have not been formally tested and certified.

4.3. Activities

Phase 1) Release Installation

The entry condition for this phase is the completion of CSR.

As described above in section 3, ClearCase and XRP II Baseline Manager will be used to maintain the different baselines on the single Release B.0/B.1 hardware string. The B.1 software will be installed as a test mode, while the B.0 software will continue as the production mode until after RRR.

Procedures that will be used in the transition from Release B.0 to Release B.1 will be specified in the Release B.1 Operator's Manual for the ECS Project, DID611. See section 3.3.1 for the types of information in the document.

Phase 2) System Reconfiguration For Transition

Mode management levies few requirements on the physical configuration of the system (some COTS products, such as AutoSys, cannot be brought up twice on a processor) but it is recommended that B.1 test and training activities should be allocated to non-production machines as far as possible, to minimize the chance of a problem in B.1 interfering with B.0 operations. The following activities are needed to reconfigure the system for transition:

1. Rearrange the MSS RAID so that it can be shared by the HP J210 Management Servers. In the normal configuration, one management server is a cold spare. In the transition configuration, one server will continue to manage B.0 and will additionally manage B.1, via the single shared management framework (HP Openview, agents, Tivoli, and so on). The other server will support test and training for other MSS functions such as accountability, user registration, and so on. The RAID rearrangement will require a shutdown of about six hours.

2. The AIT Science Processor (this could be any one of the SPRHW Science Processors) can be used to support B.1 test and training. The AIT server could be used to host the B.1 PDPS and AutoSys but is only a Sun 20/50 and would have slow performance. A

better option is to host the B.1 PDPS/AutoSys on the SPRHW Queuing Server (with the backup PDPS database).

3. One of the distribution servers will be allocated to B.1. This halves the operational capacity. Minimal reconfiguration is needed.

4. The cold spare APC Server will be allocated to B.1. Some of the RAID will be allocated to B.1 and this will reduce the amount available to B.0 for electronic pull. The electronic data pull cache will be flushed to a certain level, after appropriate warnings have been given to users, and the released storage will be allocated to B.1.

5. One of the Data Management Servers will be allocated to B.1. One way to achieve this would be to failover the B.0 primary to the backup, and then use the spare primary for B.1.

6. One of the Ingest server pair will be allocated to B.1.

7. There is only one archive set of working storage, so the WKSHW working storage server will be shared by B.0 and B.1.

8. The DRPHW cold spare server will be allocated to B.1. The silo resources (drives and tapes) will be partitioned to provide a share of capacity for B.1.

In all cases B.0 operations will be able to claim resources from B.1 test/training, in the event that an ops component fails.

The longest duration activity is the rearrangement of the MSS RAID, at six hours. If the other activities are completed in parallel, the entire reconfiguration will require a system shutdown of only about six hours.

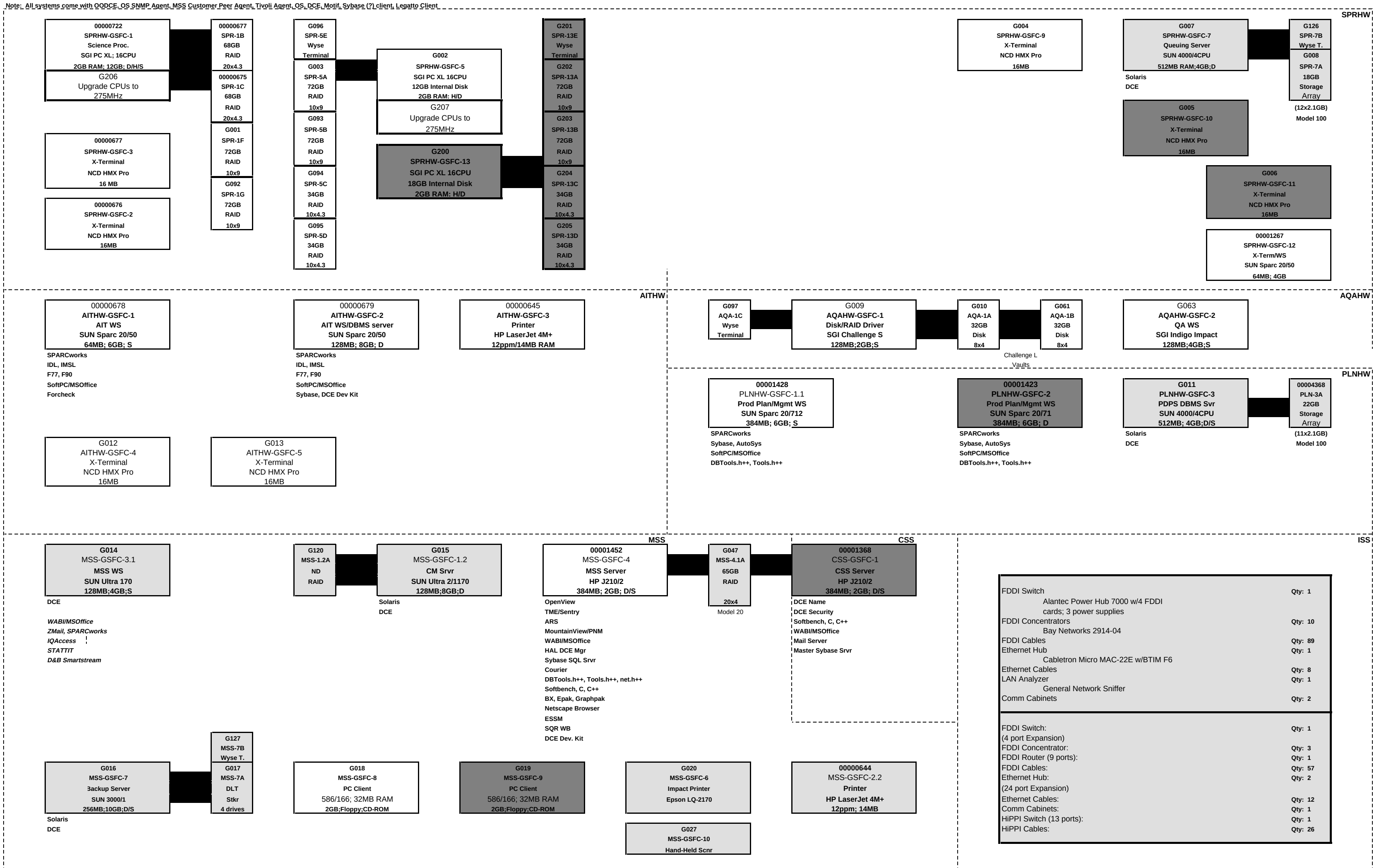
Figure 4-1 GSFC DAAC Configuration For Transition shows the hardware configuration after this reconfiguration, using GSFC as the example. This is the configuration that will be used for acceptance testing and operational readiness exercises. This configuration will be prototyped in the EDF, since mode management is being used for parallel testing of Release B iterations.

GSFC at Rel B: Second Procurement (1 of 2)

Note: All systems come with OODCE, OS SNMP Agent, MSS Customer Peer Agent, Tivoli Agent, OS, DCE, Motif, Sybase (?) client, Legatto Client

Dedicated To B.1 Test And Training

Shared By B.0 Operations And B.1 Test And Training



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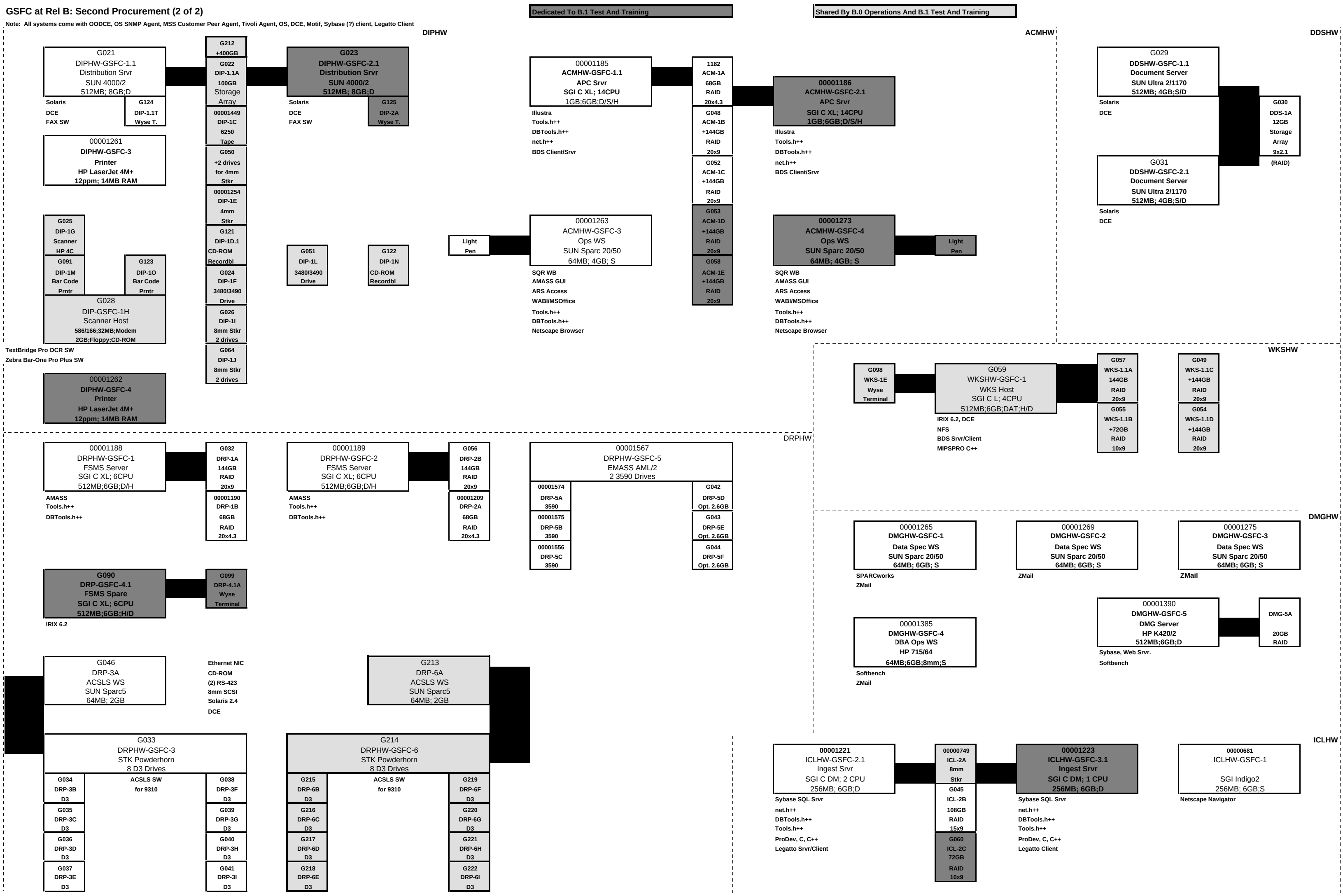
GSFC at Rel B: Second Procurement (2 of 2)

Note: All systems come with OODCE, OS SNMP Agent, MSS Customer Peer Agent, Tivoli Agent, OS, DCE, Motif, Sybase (?) client, Legatto Client



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Phase 3) Database Conversion

When the system reconfiguration for transition from B.0 to B.1 is complete, the B.1 operational databases will be established so that B.1 test and training can operate with a separate set of databases from B.0 production databases. The B.1 copies will go on to become the operational B.1 databases, and must therefore be brought fully up to date and synchronized with B.0 at switchover.

All Release B.0 databases discussed use Sybase 11. All B.1 databases except the metadata database also use Sybase 11. The metadata database could use Sybase 11 or the Informix Universal Server: a decision will be made at a later date. For planning purposes, we assume Universal Server. Some databases may have model changes, normally added classes and attributes, for B.1.

A detailed transition plan must examine the strategy, sequence, and time required to transition all data, taking into account dependencies between the databases. The following discussion is a first effort to surface some of the considerations. For further details of individual schema changes, migration scripts, etc. please refer to the individual subsystems in section 6 of this paper.

INGEST

The Ingest database contains the template descriptions of the data types which ECS will receive to ingest, plus supporting server, parameter, validation, and processing request information. It resides on the ICLHW configuration item (CI) which has two SGI processors. No B.1 model changes are expected at this time.

The bulk of the static information in the Ingest database is in the InFileTypeTemplate, InDataTypeTemplate, and InSourceMCF classes. These three classes define the files to be ingested. Once loaded, this information is relatively static. New data types are expected for Release B.1, but these are known in advance and could be loaded before or after transition. Loading before transition is recommended to get as much done early as possible. A second category of classes is validation information which is loaded once, is static, and is low volume.

The database also contains InRequestProcessHeader, InRequestProcessData, and InRequestFileInfo classes which describe ingest requests waiting, in process, or recently completed. The DAAC operator can set a parameter to delete these records after a given number of to-be-determined hours, perhaps four or eight. Before the request is deleted, it is summarized in the InRequestSummaryHeader and InRequestSummaryData classes from where it goes to MSS. The data could be kept in the summary tables for three or four months as a historical record. The Ingest database also has the normal Sybase log files associated with it.

For testing purposes, the ingest data type descriptions and validation information could be copied into a test database running on the Ingest server dedicated to B.1. This test copy would contain the request processing information for testing purposes. It will compete for disk resources with the operational copy and may cause performance degradation.

At transition time, the ingest requests in process must be either transitioned or completed. Ingest requests will be arriving at the approximate rates shown in table 4.2 These estimates are based on information in the February 1996 technical baseline and are considered high.

Table 4.2 Estimated Granules Received for Ingest Q4 1998

DAAC	Granules per Day	Granules per Hour
GSFC	8730	364
EDC	4628	193
LaRC	1836	77
NSIDC	1120	47

If ECS is operating under mode management, the Ingest database could be brought over to B.1 and all new ingest requests passed to the B.1 system. All requests in B.0 are worked off under B.0. This means the B.0 metadata database must be available for processing the ingest request and its final transition made after B.0 Ingest is shut down.

The estimated time to copy the Ingest database, disk space needed, memory usage, estimated time to work off in-process requests, and performance degradation need to be determined. Strategies to either work off the existing B.0 requests or pass them on to B.1 also need analysis: see the next release of this paper.

ADVERTISING

The Advertising database contains information about products and services available. It resides on the DMGHW CI which currently has a pair of Sun 4000 class processors, one of which will house the B.0 copy of the database while the other houses the B.1 copy. Using the same RAID may create performance issues, however, presumably the testing usage is low.

Advertising information can be treated as static over a period of several days. To create a test copy, only a subset of the records is needed, perhaps all those relating to a particular data product.

STORAGE MANAGEMENT PULL MONITOR

The Storage Management Pull Monitor Database(SMPMD) contains information about tape drives available, requests needing resources, and the requested files stored in cache. It resides on the ACMHW CI which has two SGI processors, one of which is normally a spare and will be dedicated to B.1 test/training.

The SMPMD design is being enhanced at this writing. The current model has Stackers, Slots, and Drives classes which contain information about tape drives available. This information is initialized when the server comes up and has static (drives in system) and dynamic (tapes in drives) characteristics. It does not need to be preserved in a transition as the information would be reinitialized at startup.

The Request and associated classes have information about requests needing resources. Their life span is measured in minutes or hours and, for migration purposes, could be handled as something that gets worked off once new requests stop entering the system.

The pull_link and pull_list classes contain information about requested files stored in cache. This information is used to identify those files actively used vs. those aging which could be deleted from the cache to aid performance. Normally, this information is not transitioned to a new system. Rather, a new list of files in the new cache is gradually developed. The old cache is flushed.

For all classes in the SMPMD, the new test database becomes the operational database. The old data is not transitioned. The sharing of cache space and tape drives under mode management needs to be investigated.

PDPS

The Planning and Data Processing Subsystem(PDPS) database contains information about PGEs and production plans. It resides on the PLNHW CI which has one Sun 4000/4 class CPU. The SPRHW queuing server provides a hot spare. It also has other processing loads.

The PGE information can be treated as static over a period of days. Descriptive information about ECS components is also static. Information about component usage is dynamic as is information about production plans and activities.

Data model changes between B.0 and B.1 will necessitate converting the data with a script supplemented with manual edit.

If a testing copy of the PDPS is put on the spare, there is a potential performance and RMA loss. If the copy is put on PLNHW, there is a potential performance loss.

At transition time, either the existing B.0 production plans can be worked off and new plans developed on B.1 or the B.0 plans can be carried over to B.1. If the plans are worked off, new products created need to be carried over to B.1.

ASTER LUT

The ASTER Lookup Table (LUT) contains atmospheric correction parameters. It is located on the ASTER LUT CI at EDC only, which has Sun Ultra CPUs. The information is static and loaded from a tape provided by the U.S. ASTER IT. For testing and B.1 operation, the B.0 copy of the file can be used unless new parameters are supplied. Loading the new parameters is routine.

METADATA DATABASE

The Metadata database contains the collection and granule level metadata for ECS products, document metadata, suppliers, algorithms, and other descriptive information. It runs under Sybase 11 in B.0 and may change to run under the Informix Universal Server in B.1. It resides on the ACMHW CI which has two SGI processors, one of which is a warm spare. There will be model changes between B.0 and B.1.

The information in the Metadata database is incremental, i.e., new information is constantly being added, but the old information changes little if at all. The information is site specific. Products resident at one site only are inventoried only at that site (they are advertised to other sites via the Advertising database).

Table 4.3 shows an estimate, believed to be high, of the number of granules coming from Ingest which might reside at each DAAC by Q4, 1998. The ingest rates and volumes are based on numbers supplied by the ITs in the Feb 1996 Technical Baseline and assume one file produced means one granule is produced. The estimates give some indication of the actual volume of data to be transitioned, from which time estimates to do the transition can be made.

Table 4.3 Estimated Q4 1998 Accumulated Ingest Granule Count

DAAC	Accumulated Ingest Volume (granules)
EDC	4 Mo = 555,360
GSFC	2 Mo = 523,800
LaRC	2 Mo = 110,160
NSIDC	1 Mo = 33,600

Accumulations are 30 days * number of months shown. Exact launch dates, instrument settling down, etc. are not considered.

Estimates are believed to be high, providing an upper limit. Actual volumes may be significantly lower.

A test copy of the metadata database can be made by using only a small percentage of the granule records and a restricted set of products. One strategy for transitioning the operational copy involves taking a snapshot of the database at a point in time, making data model adjustments, and bringing the copy up under the new DBMS. This is part of the preparatory work for transitioning to B.1. It is expected to take many hours. Later, a second pass is made to get updates since the snapshot was taken. Disk space to hold two copies of the metadata must be planned.

Phase 4) Translation/Installation Of Scripts And Other Software From B.0 To B.1

In addition to the migration of data, a significant amount of software must be migrated from B.0 to B.1. During the operational life of B.0, the sites will develop a legacy of both delivered and home-grown software. This software which may require migrating includes:

- General purpose scripts
- Configuration files
- HP OpenView maps
- COTS customization data
- Web pages and associated cgi scripts.
- Product Generation Executables (PGEs)
- ESDTs, if data model changes do not force a re-delivery
- Keytab files
- Help files, if not re-delivered
- ACL Databases
- Documents
- CMI Files

Note that since there is no separate hardware string for B.1, some of this software will simply remain in place. For safety, it should be verified that the latest versions are under configuration management prior to transition.

After launch, PGEs may be modified slightly by the ITs. To make these modifications, some teams may choose to replace the entire PGE including all source, executables, and test data. Other instrument teams may choose to replace only a single routine used by the PGE. For transition from B.0 to B.1, assuming this is post launch, ECS will need to transition the PGEs rather than expect new code from the ITs. The B.1 PGE operation must be compared with the B.0 operation given the potential for change in COTS software between B.0 and B.1. Any attribute changes made between the B.0 and B.1 models must also be addressed.

Phase 5) Acceptance Testing

Mode management will be used to support acceptance testing to the maximum extent feasible to prevent production downtime. However, some tests will use significant system resources. Acceptance testing does not include stress testing at the sites (ECS Ground System (EGS) testing will include stress tests) but it will show that the system meets the performance limits stated in the requirements. The test procedures will call for a System Performance Scenario to demonstrate that the system can handle the specified volumes of science data within the given time constraints, handling transactions within prescribed response time envelopes, confirming archiving capacity of DAACs, and distributing data within the required times. The performance requirements, as specified in ECS documentation, are verified under specified operational conditions. The emphasis is on testing in a simulated or near real operational environment, typifying moderately loaded and busy system conditions. Response time, archiving capacity and expansion capability performance measures are emphasized. The scenario will verify the ECS capability to generate and gather statistics and measure performance pertaining to DAAC operations and end-to-end message traffic.

Also, note that the acceptance test schedule assumes interference-free access to the system, which will not be the case when mode management is used, since the system will be shared with production. The current test schedule requires 3 months, to cover all sites.

Acceptance testing ends when RRR is completed.

Phase 6) Training

M&O training of operators on the new system consists of allowing the trainers time to verify their training materials, and then to conduct the actual operator training. For the B.0 to B.1 sites, the training will be for the new capabilities delivered in B.1, while at ORNL and JPL full system training will be performed.

This activity can proceed in parallel with testing. Mode management will allow production, test, and training modes in parallel, to the full extent of system resources.

Training plans and training materials for the ECS system are being documented in DID 622 and DID 625, respectively.

Phase 7) Operations Exercises

M&O will run certain tests to prove the system, such as verifying that functionality in both B.0 and B.1 produces the same results when run on the same data. Tests will also include running the B.1 software in the production mode (called “OPS”) to verify that it behaves in the same way as in test mode.

Phase 8) Operational Readiness Review

This review is preceded by operational readiness exercises to verify that all acceptance tests and operations readiness tests have been successfully completed. When this review has been completed, the system can go operational. The objectives of the ORR are to:

- verify that operations and maintenance personnel have been adequately trained
- determine system's readiness for operations
- establish the product (operational) baseline.

An overview of the ORR is in section 3.3.2. Unlike B.0, when the ORR was held separately for each DAAC, the B.1 ORR will be held for the system as a whole, and all DAACs will then enter B.1 operations at about the same time, to avoid problems with cross-DAAC operations between DAACs at different release levels.

Phase 9) Release Switchover

It is assumed for the present that a piecemeal approach, involving switchover of individual subsystems, will not be adopted; the whole system will switch from B.0 to B.1. Because the B.1 system has a number of cross-site interfaces, the decision to switch must be coordinated with other DAACs and the SMC. Switchover will involve an interruption in service, so should be scheduled at a quiet time (overnight or at a weekend). The switchover process comprises the following:

1) Users are prevented from logging on, and users already logged on are prevented from making new requests, via controls at the Client web server, Local/Distributed Information Managers, and Science Data Server. Users can continue to use normal methods to monitor incomplete jobs and requests in progress.
2) Unstarted jobs (i.e. a plan/production schedule) are moved to the new system.
3) Ingest sessions are completed; running jobs are allowed to complete; all work queues are drained, and the system comes to a quiescent state.
4) A final backup of B.0 databases is taken.
5) A final refresh of B.1 databases is made, to pick up any changes since the previous refresh.
6) The B.1 software is changed from test mode directories to production mode directories. The production mode directory will be set up as a soft link so that it can be easily switched from B.0 to B.1.
7) Confidence tests are run on the new system.
8) Production jobs are started on the new system.
9) Users are admitted to the B.1 system.

To avoid problems with sites running different releases, the sites must switch to B.1 at approximately the same time. The risk can be mitigated by gaining confidence with B.1 at the JPL site before switching at the B.0 sites. The ORNL installation is sufficiently different that it is not recommended as a test site.

There should be no operational use of the system which involves mixed B.0 and B.1 sites, since it would require not only additional test effort to prove the mixed configuration safe, but also special procedures to avoid attempts to use Release B.1 capabilities that are not yet present at the Release B.0 sites.

The following inter-site interfaces have been identified:

1) Cross-site subscriptions
2) Log files, summary data, reports, faults, and critical events from DAACs to SMC
3) Trouble tickets between DAACs and SMC
4) Cross-site searches and data queries; data orders
5) Remote inserts from PDPS to Science Data Server
6) User profiles
7) Database replication (eg. Advertising database) at remote sites
8) Web servers
9) Data Dictionary to ASTER Gateway (only in B.1)
10) DIM/LIM interfaces (only in B.1)
11) Ingest interfaces.

Phase 10) System Reconfiguration For Operations

Once switchover is complete and operations are progressing smoothly the system resources that were reserved for B.0 can be added to B.1. As described above for Phase 3, the reconfiguration will require a system outage of about six hours, assuming that enough staff are available to work the subsystems in parallel. After the reconfiguration it will still be possible to run test and training modes, but with more shared hardware.

Phase 11) Discrepancy Workoff

Once the transition phases are completed it will probably be necessary to resynchronize the software baselines of the developers and SEO. Any patches and bug fixes that went into B.0, but didn't get into B.1 prior to switchover, must be installed in B.1. The DDTS NCR system keeps track of the NCRs against each release. During the transition phases, the development team's management and SEO management must coordinate to steer changes away from the old release and toward the new one, and to impose a cutoff for changes to the old system.

Phase 12) Terminate Prior Release

The schedule calls for termination of Release B.0 on January 6, 1999. It is the DAAC Manager's decision when to remove B.0 artifacts from the system, as part of normal housekeeping. This involves a delete or archival of backups and dead ClearCase paths.

4.4. Risks

There are several risks in the B.0 to B.1 transition.

1) There is a technical risk of inadequate or unsatisfactory operation of mode management at the DAACs, since B.0 to B.1 is the first transition to use the mode management capability. This is being mitigated by using mode management in-house to manage the parallel development iterations of B.0. The decision has been made to use Mode Management in support of iteration testing in Release B Integration, starting with the first iteration of the Release Critical build. In short this means that we will have different iterations testing at the same time in a single environment (e.g. mini-DAAC) but operating under different modes (i.e., multiple instances of servers in single CDS name space, distinguished by mode identifier-appended naming, etc...). This will result in a more mature, well-understood capability being delivered to the DAACs.

2) Parallel operations, test, and training may cause bottlenecks in the DAAC environment. Shared system resources will include CPU cycles, network bandwidth, memory, disk, RAID, and archive throughput. Other points of contention will include access to workstations, and use of external interfaces.

3) A hardware failure of a key component may threaten the hardware available for test and training modes.

Any unforeseen dependencies in the planning of the transition may lead to problems.

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5. Site Plans

The sites described in this section comprise the ECS system in the Release B timeframe. This section of the document presents a brief overview of each DAAC, its hardware configuration at Release B.0 or B.1 depending on when the DAAC first goes operational, and an activity schedule of installations, testing, and reviews for the DAAC. The hardware diagrams are the current snapshot, but they do change due to development, market opportunities, requirements clarifications, etc.

A later version of this paper will show how the Release B system evolves at each site, in terms of hardware and COTS software products. Differences between the initial Release B hardware and later evolutions of Release B exist mainly in the number of science processors, and the number and kind of archive tape libraries. (The scope of this paper includes work associated with hardware and COTS replacements and additions, as well as major software releases). A later version of this paper will also identify activity contentions and provide suggested resolutions. This includes consideration of impacts, if any, to existing missions. Existing missions handled by non-ECS systems such as V0 will continue to be handled by non-ECS systems throughout the transition phases.

5.1 GSFC ECS DAAC

The GSFC concentrates on upper atmospheric data and will receive MODIS data from the AM-1 Launch. GSFC has one of the larger B.0 hardware configurations as shown in Figure 5.1-1 pages 1 and 2. The *GSFC Release B Installation Plan (First Procurement)* showing floor plans, hardware diagrams, network connectivity, and power usage has been approved in draft form and will be published shortly as a white paper, document number 800-TP-011-001.

GSFC has a special role in ECS as the first site to receive ECS hardware and software releases. GSFC will be used for B.0 verification dry run and formal tests beginning in April, 1997. This will be followed by acceptance tests.

The schedule for activities at GSFC in the transition timeframe is shown in Figure 5.1-2.

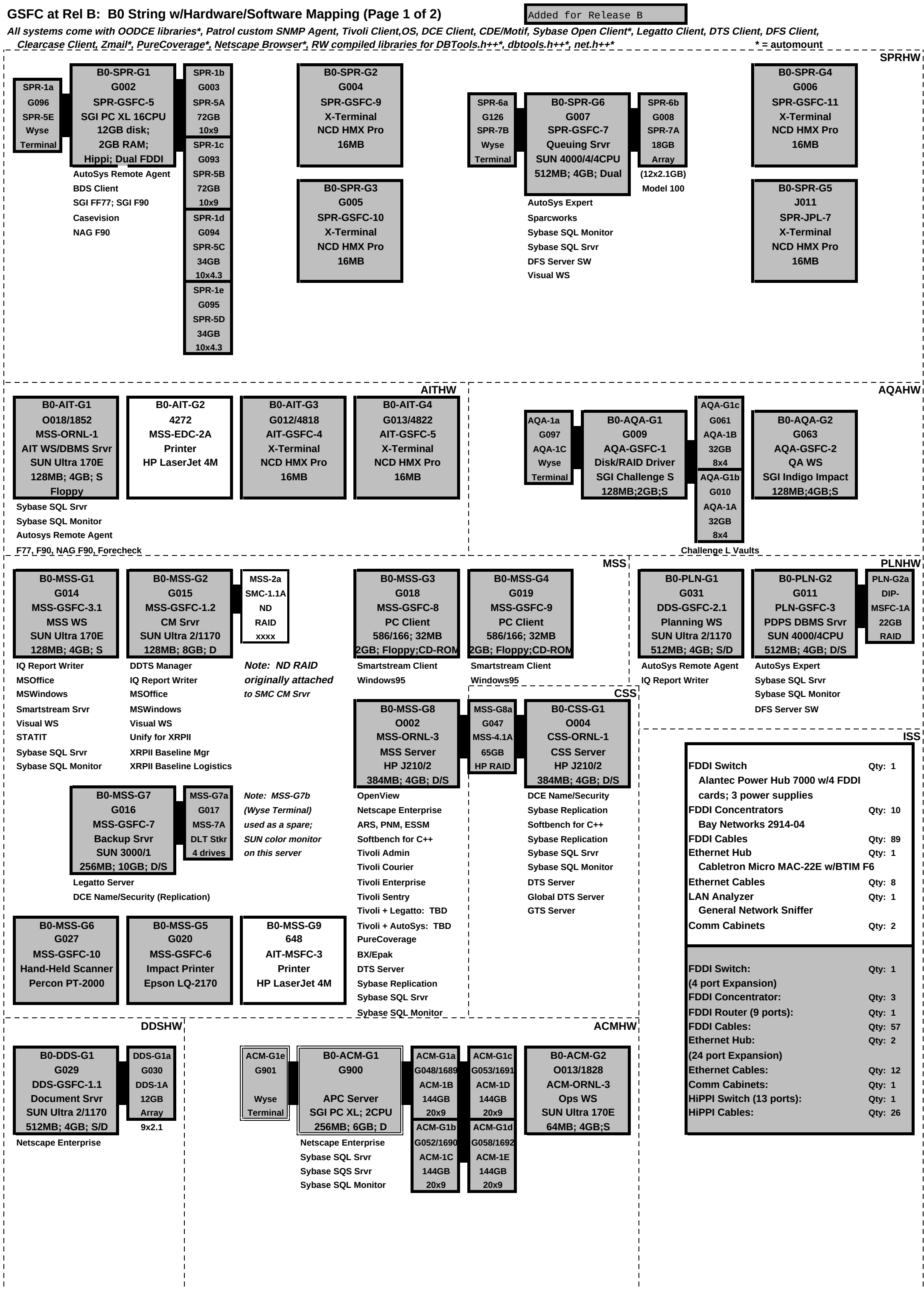

Figure 5.1-1. GSFC B.0 Hardware Configuration

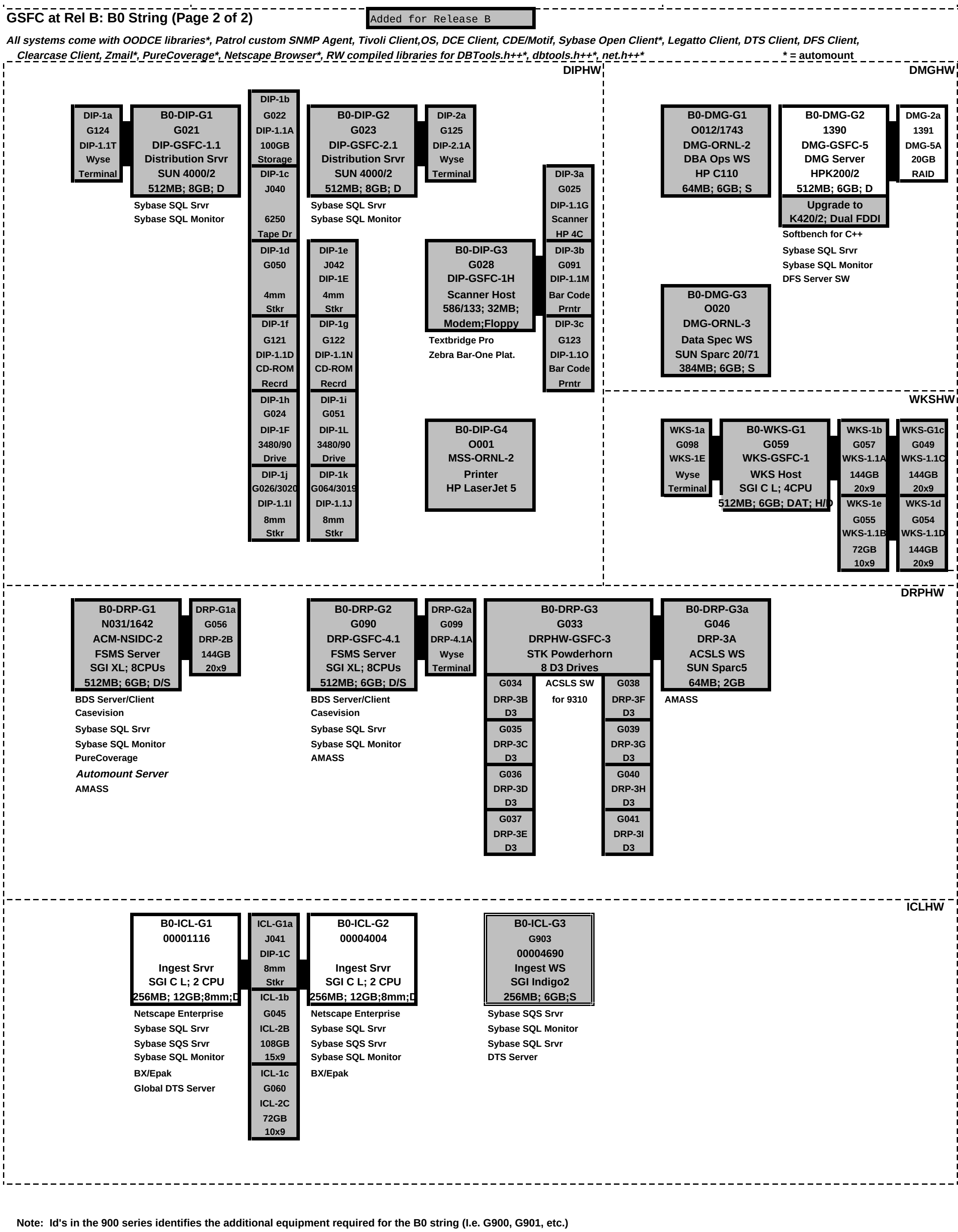

Figure 5.1-1. GSFC B.0 Hardware Configuration (cont.)

Dates as of 2/17/97 Schedule

ID	Task Name	96 – 1997 – 1998
1	**GSFC DAAC ACTIVITIES**	2/24 – 10/19
2		
3	**T:Testbed Installation and Operation**	
4	T:Install Testbed Hardware-GSFC	1/1 – 3/27
5	T:Install Testbed Software-GSFC	4/1 – 5/1
6	T:Testbed Operational-GSFC	5/1 – 4/3
7	T:Terminate Testbed	4/3 – 4/3
8		
9	**B.0:Prepare and Install Site Configuration**	
10	B.0:Procure,test,ship HW-GSFC	9/23 – 1/10
11	B.0:Install HW and LAN - GSFC	12/15 – 2/2
12	B.0:Install and Configure COTS SW - GSFC	2/3 – 4/17
13	B.0:Start Developer Integration & Test - GSFC	3/31 – 3/31
14		
15	**B.0:Verification Testing**	
16	B.0:Perform Verification Dry Runs	4/1 – 9/23
17	B.0:TRR	6/23 – 6/23
18	B.0:Run Formal System Tests	6/23 – 10/7
19		
20	B.0:Deliver DID 603 - Operational Readiness Plan	10/20 – 10/20
21	B.0:Deliver DID 611 - Mission Operations Procedures	10/20 – 10/20
22	B.0:Deliver DID 625 - Training Material	10/20 – 10/20
23	B.0:Perform Preliminary Training - GSFC	9/9 – 9/11
24		
25	**B.0: Acceptance Testing**	
26	B.0:Perform Acceptance Test Dry Runs	8/15 – 11/12
27	B.0:CSR	10/31 – 10/31
28	B.0:Perform Acceptance Testing	11/3 – 12/23
29		
30	B.0:Deliver DID 526 - Standard Repair Procedures	12/3
31	B.0:Deliver DID 618 - Replacement Part List & Spare Parts List	12/17
32	B.0:Deliver DID 619 - Test & Support Equip. Reqt's List	12/17
33	B.0:Deliver DID 626 - M&O Certification Plan	12/17
34	B.0:RRR	12/30 – 12/30
35		
36	**B.0:Operational Readiness**	
37	B.0:Perform Operational Readiness Activities	12/30 – 2/3
38	B.0:Conduct M&O Classroom Training - EDC (Release B.0)	1/30 – 2/19
39	B.0 ORR - TBD	2/3 – 2/3
40		
41	**B.0:Add Second HW Buy**	
42	B.0:Deliver Buy 2 Installation Plan - EDC	10/3
43	B.0:Purchase, Test, and Ship HW/SW - EDC	9/15 – 1/6
44	B.0:Install Buy 2 HW and LAN-EDC	12/22 – 1/20
45	B.0:Install and Configure COTS & Custom SW - EDC	1/21 – 2/17
46		
47	**B.0:Testbed to B.0 Migration**	
48	B.0:Prepare for Testbed-B.0 Transition	1/2 – 3/20
49	B.0:Transition to B.0	3/23 – 4/10
50	B.0:Terminate Testbed	4/3 – 4/3
51		
52	**B.0:SSI&T**	
53	Mode Managed Test and Training	2/3 – 9/28
54	EGS Testing	2/3 – 9/28
55		
56	**B.1 Verification Testing - N/A**	
57	B.1:Deliver DID 603 - Operational Readiness Plan	6/17 – 6/17

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Figure 5.1-2. GSFC DAAC Transition Timeframe Activities

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
58	B.1:Deliver DID 611 - Mission Operation	6/17	6/17
59	B.1:Deliver DID 625 - Training Material	6/17	6/17
60			
61	**B.1:Acceptance Tests**		
62	B.1:Dry Run Acceptance Tests	4/17	5/12
63	B.1:CSR	7/1	7/1
64	B.1:Perform Acceptance Tests	7/1	8/25
65			
66	B.1:Deliver DID 526 - Standard Repair	9/16	9/16
67	B.1:Deliver DID 618 - Replacement Part	9/30	9/30
68	B.1:Deliver DID 619 - Test & Support Equipment	9/30	9/30
69	B.1:Deliver DID 626 - M&O Certification Plan	9/30	9/30
70	B.1:RRR	9/1	9/1
71			
72	**B.1:Operational Readiness**		
73	B.1:Perform Operational Readiness Activities-TBD	9/1	10/1
74	B.1:Conduct M&O Classroom Training - GSFC	10/27	10/30
75	B.1:ORR-TBD	10/1	10/1
76			
77	**B.1:Transition from Release B.0 to B.1**		
78	B.1:Prepare for Release B.0 to B.1	10/14	12/
79	B.1:Transition from Release B.0 to B.1	12/24	
80	B.1:Terminate B.0 Operations	1/6	1/

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Figure 5.1-2. GSFC DAAC Transition Timeframe Activities (cont.)

5.2 LaRC ECS DAAC

The LaRC DAAC emphasizes radiation, aerosols, and tropospheric chemistry. It will receive CERES, MISR, and MOPITT data from the AM-1 launch in June 1998 and SAGE III data from the Meteor launch in August 1998.

The LaRC B.0 hardware configuration is shown in Figure 5.2-1 pages 1 and 2. *The LaRC Release B Installation Plan (First Procurement)* showing floor plans, hardware diagrams, network connectivity, power usage will be published in March 1997 as white paper document number 800-TP-10-001.

The schedule for activities at LaRC in the transition timeframe is shown in Figure 5.2-2.

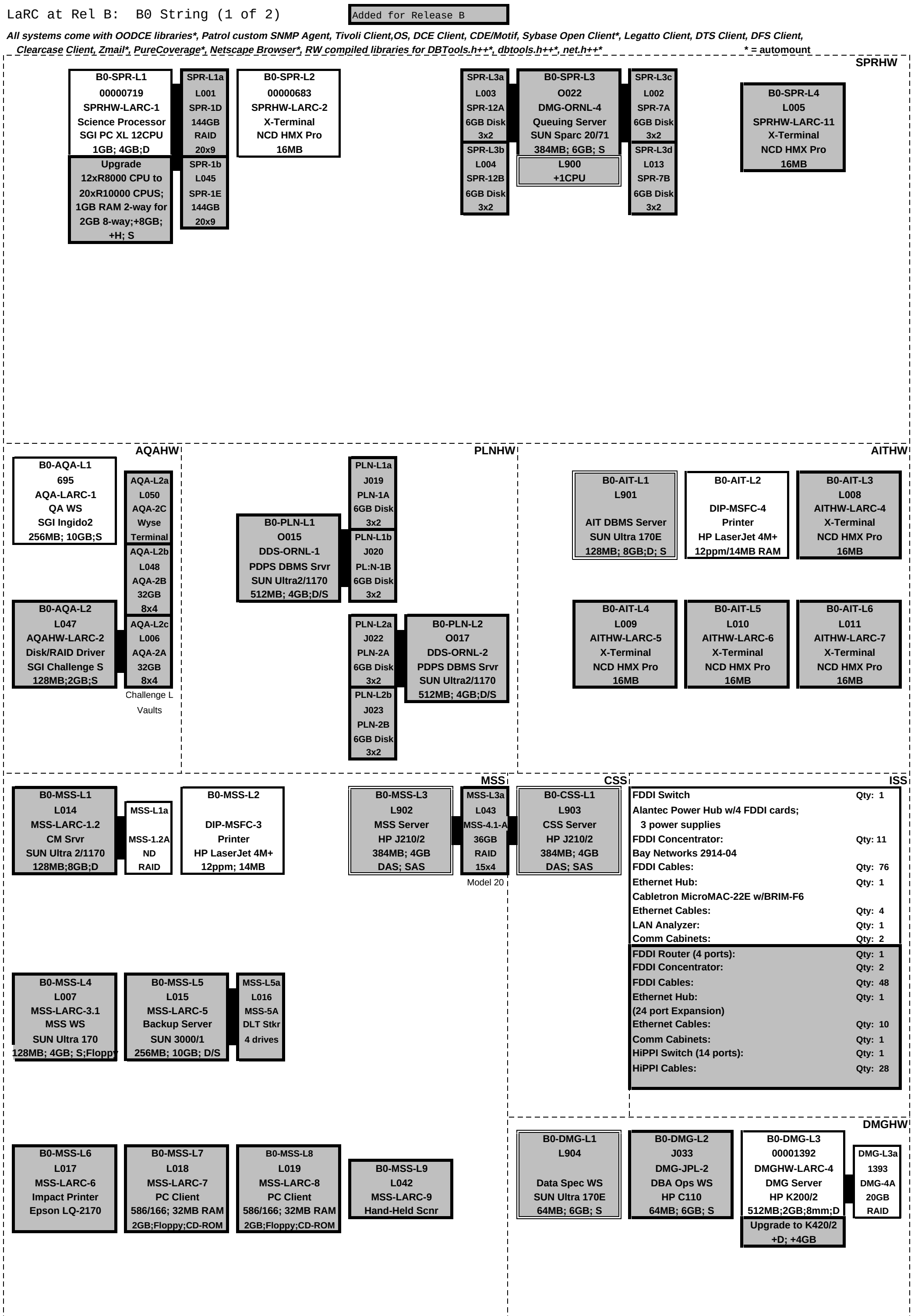

Figure 5.2-1. LaRC B.0 Hardware Configuration

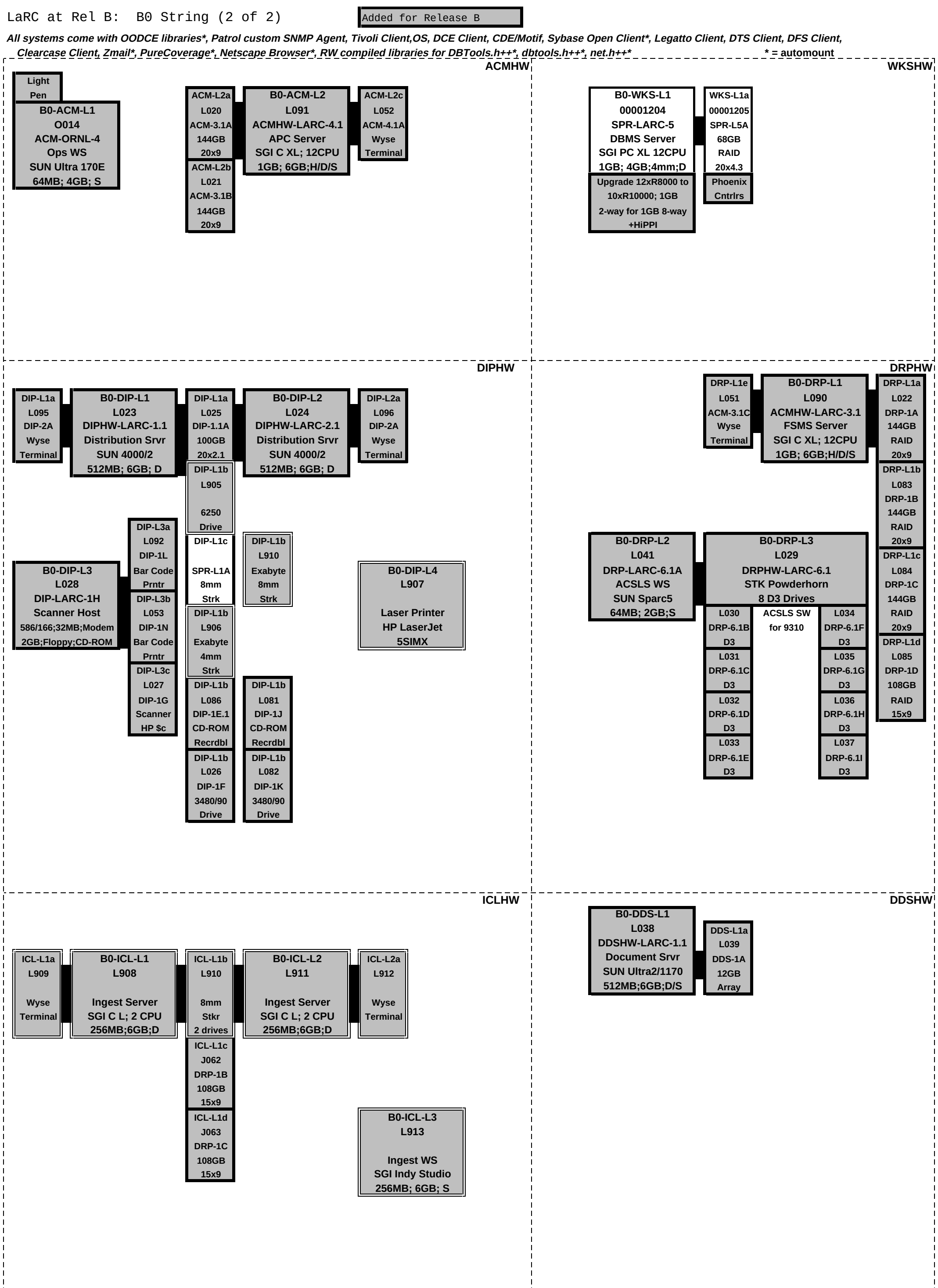

Figure 5.2-1. LaRC B.0 Hardware Configuration (cont.)

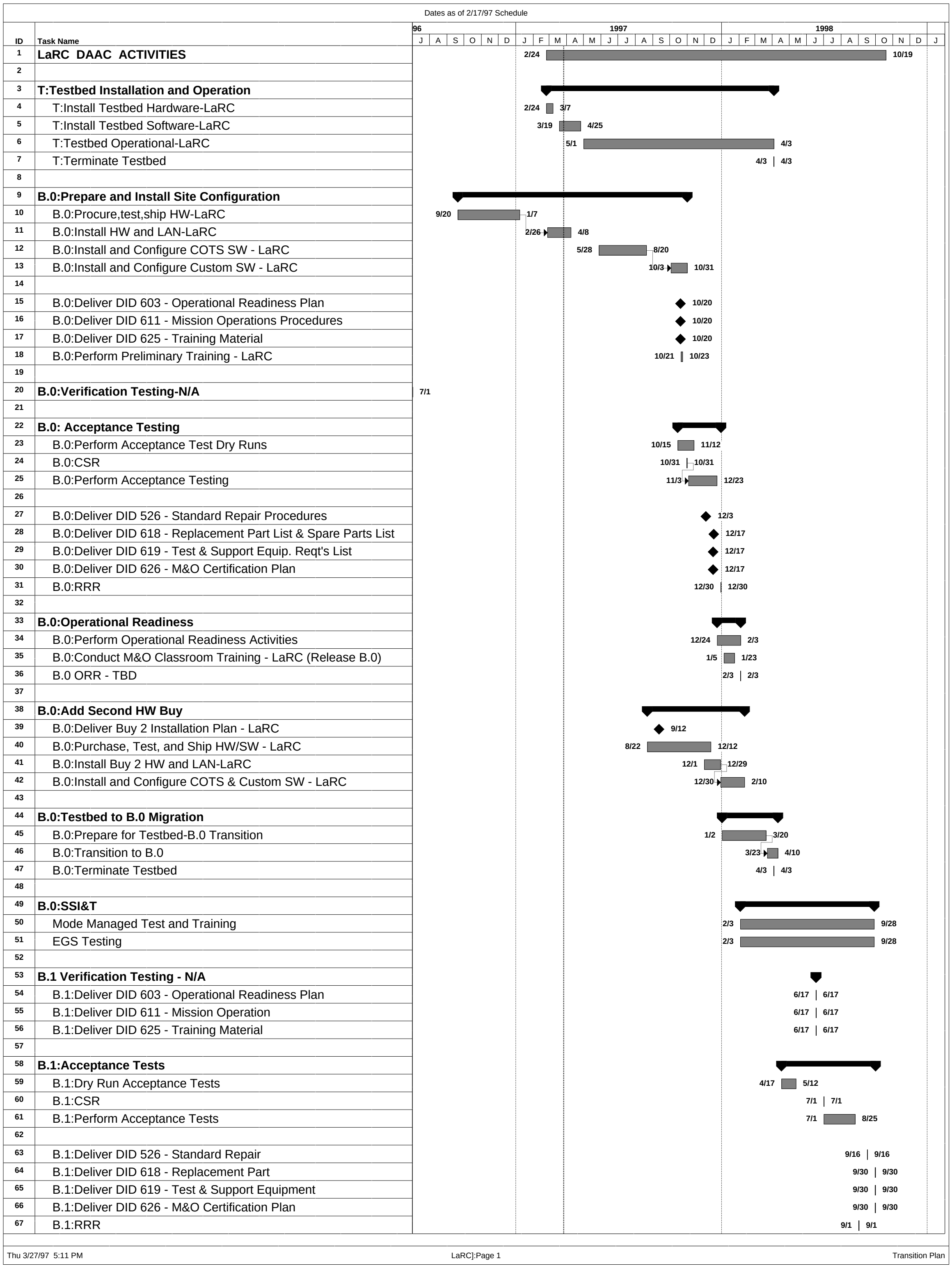

Figure 5.2-2. LaRC DAAC Transition Timeframe Activities

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
68			
69	**B.1:Operational Readiness**		
70	B.1:Perform Operational Readiness Activities-TBD	9/1	10/1
71	B.1:Conduct M&O Classroom Training - LaRC	10/14	10/19
72	B.1:ORR-TBD	10/1	10/1
73			
74	**B.1:Transition from Release B.0 to B.1**		
75	B.1:Prepare for Release B.0 to B.1	10/14	12/2
76	B.1:Transition from Release B.0 to B.1	12/24	
77	B.1:Terminate B.0 Operations	1/6	1/

Thu 3/27/97 4:57 PM LaRC]:Page 2 Transition Plan

Figure 5.2-2. LaRC DAAC Transition Timeframe Activities (cont.)

5.3 EDC ECS DAAC

The EDC DAAC houses Landsat and other land processes data. It will receive Landsat 7 data from the May 1998 launch and MODIS land products from the AM-1 launch in July 1998.

The EDC B.0 site hardware configuration is similar to the LaRC configuration shown in Figure 5.2-1. *The EDC Release B Installation Plan (First Procurement)* (800-TP-007-001) shows floor plans, hardware diagrams, network connectivity, and power usage. The schedule for activities at EDC in the transition timeframe is shown in Figure 5.3-1.

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
1	**EDC DAAC ACTIVITIES**	2/24	10/19
2			
3	**T:Testbed Installation and Operation**		
4	T:Install Testbed Hardware-EDC	4/4	4/17
5	T:Install Testbed Software-EDC	4/18	5/8
6	T:Testbed Operational-EDC	5/8	4/3
7	T:Terminate Testbed	4/3	4/3
8			
9	**B.0:Prepare and Install Site Configuration**		
10	B.0:Procure,test,ship HW-EDC	9/20	2/5
11	B.0:Install HW and LAN-EDC	2/6	4/10
12	B.0:Install and Configure COTS SW - EDC	7/24	10/2
13	B.0:Install and Configure Custom SW - EDC	10/3	10/31
14			
15	B.0:Deliver DID 603 - Operational Readiness Plan		10/20
16	B.0:Deliver DID 611 - Mission Operations Procedures		10/20
17	B.0:Deliver DID 625 - Training Material		10/20
18	B.0:Perform Preliminary Training - EDC	10/21	10/23
19			
20	**B.0:Verification Testing-N/A**	7/1	
21			
22	**B.0: Acceptance Testing**		
23	B.0:Perform Acceptance Test Dry Runs	10/15	11/12
24	B.0:CSR	10/31	10/31
25	B.0:Perform Acceptance Testing	11/3	12/23
26			
27	B.0:Deliver DID 526 - Standard Repair Procedures		12/3
28	B.0:Deliver DID 618 - Replacement Part List & Spare Parts List		12/17
29	B.0:Deliver DID 619 - Test & Support Equip. Reqt's List		12/17
30	B.0:Deliver DID 626 - M&O Certification Plan		12/17
31	B.0:RRR	12/30	12/30
32			
33	**B.0:Operational Readiness**		
34	B.0:Perform Operational Readiness Activities	12/30	2/3
35	B.0:Conduct M&O Classroom Training - EDC (Release B.0)	1/16	2/12
36	B.0 ORR - TBD	2/3	2/3
37			
38	**B.0:Add Second HW Buy**		
39	B.0:Deliver Buy 2 Installation Plan - EDC		10/3
40	B.0:Purchase, Test, and Ship HW/SW - EDC	9/15	1/6
41	B.0:Install Buy 2 HW and LAN-EDC	12/22	1/20
42	B.0:Install and Configure COTS & Custom SW - EDC	1/21	2/17
43			
44	**B.0:Testbed to B.0 Migration**		
45	B.0:Prepare for Testbed-B.0 Transition	1/2	3/20
46	B.0:Transition to B.0	3/23	4/10
47	B.0:Terminate Testbed	4/3	4/3
48			
49	**B.0:SSI&T**		
50	Mode Managed Test and Training	2/3	9/28
51			
52	**B.1 Verification Testing - N/A**		
53	B.1:Deliver DID 603 - Operational Readiness Plan	6/17	6/17
54	B.1:Deliver DID 611 - Mission Operation	6/17	6/17
55	B.1:Deliver DID 625 - Training Material	6/17	6/17
56			
57	**B.1:Acceptance Tests**		

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Figure 5.3-1. EDC DAAC Transition Timeframe Activities

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
58	B.1:Dry Run Acceptance Tests	4/17	5/12
59	B.1:CSR	7/1	7/1
60	B.1:Perform Acceptance Tests	7/1	8/25
61			
62	B.1:Deliver DID 526 - Standard Repair	9/16	9/16
63	B.1:Deliver DID 618 - Replacement Part	9/30	9/30
64	B.1:Deliver DID 619 - Test & Support Equipment	9/30	9/30
65	B.1:Deliver DID 626 - M&O Certification Plan	9/30	9/30
66	B.1:RRR	9/1	9/1
67			
68	**B.1:Operational Readiness**		
69	B.1:Perform Operational Readiness Activities-TBD	9/1	10/1
70	B.1:Conduct M&O Classroom Training-EDC	10/20	10/23
71	B.1:ORR-TBD	10/1	10/1
72			
73	**B.1:Transition from Release B.0 to B.1**		
74	B.1:Prepare for Release B.0 to B.1	10/14	12/
75	B.1:Transition from Release B.0 to B.1	12/24	
76	B.1:Terminate B.0 Operations	1/6	1

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Figure 5.3-1. EDC DAAC Transition Timeframe Activities (cont.)

5.4 NSIDC ECS DAAC

The NSIDC DAAC focuses on snow and ice processes emphasizing interactions between snow and ice and the atmosphere and ocean. It will receive MODIS Level 2 snow and ice data after processing from the AM-1 launch.

The NSIDC B.0 site hardware configuration is shown in Figure 5.4-1 pages 1 and 2. This configuration will be installed in May, 1997. The Ingest software is hosted by the ACMHW CI at NSIDC, and this may cause contention when test and training activities run in parallel with production. The *Release B NSIDC Facility Plan* (302-CD-006-001) has been published and the installation plan publication is scheduled for April 1997.

The schedule for activities at NSIDC in the transition timeframe is shown in Figure 5.4-2.

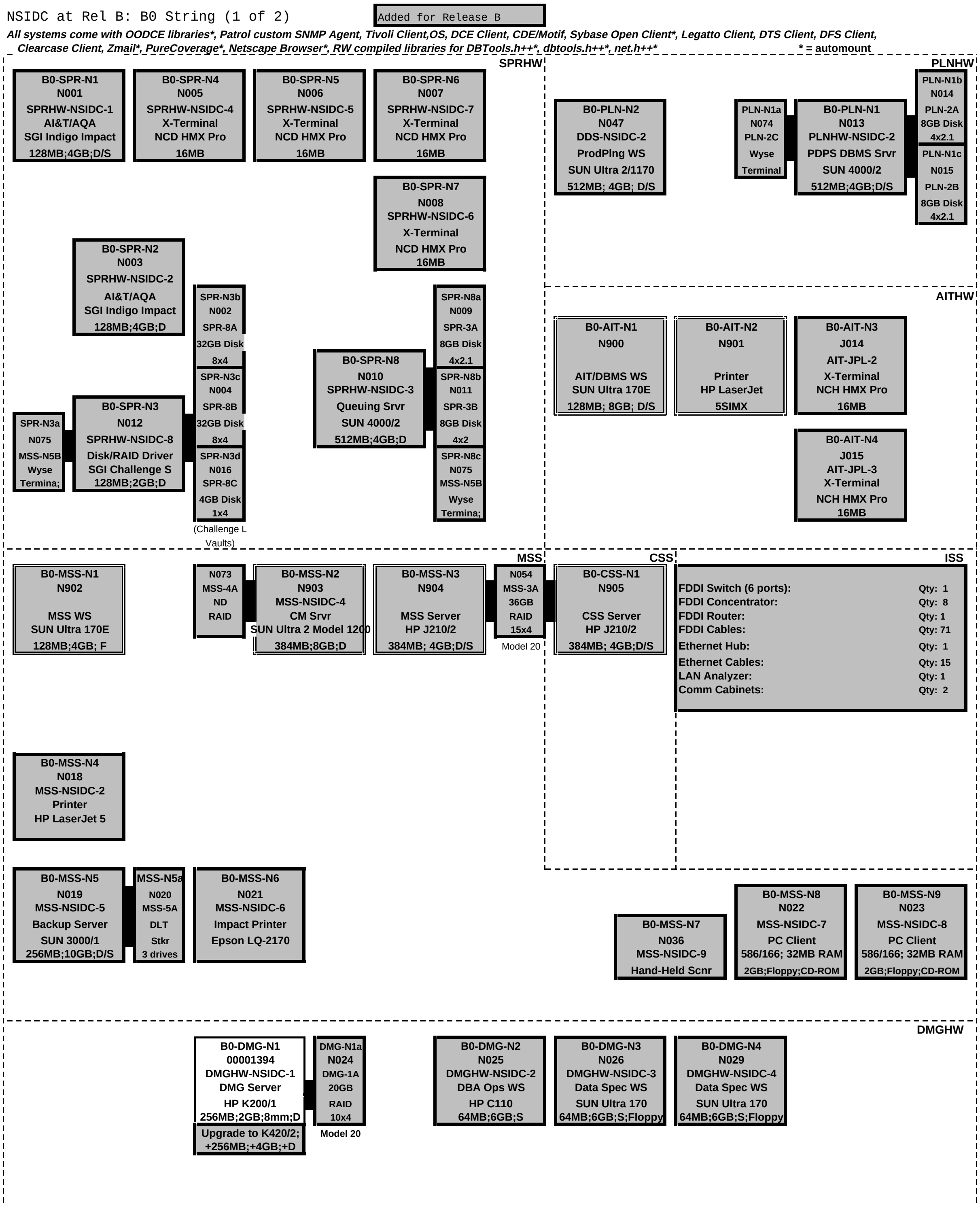

Figure 5.4-1. NSIDC B.0 Hardware Configuration

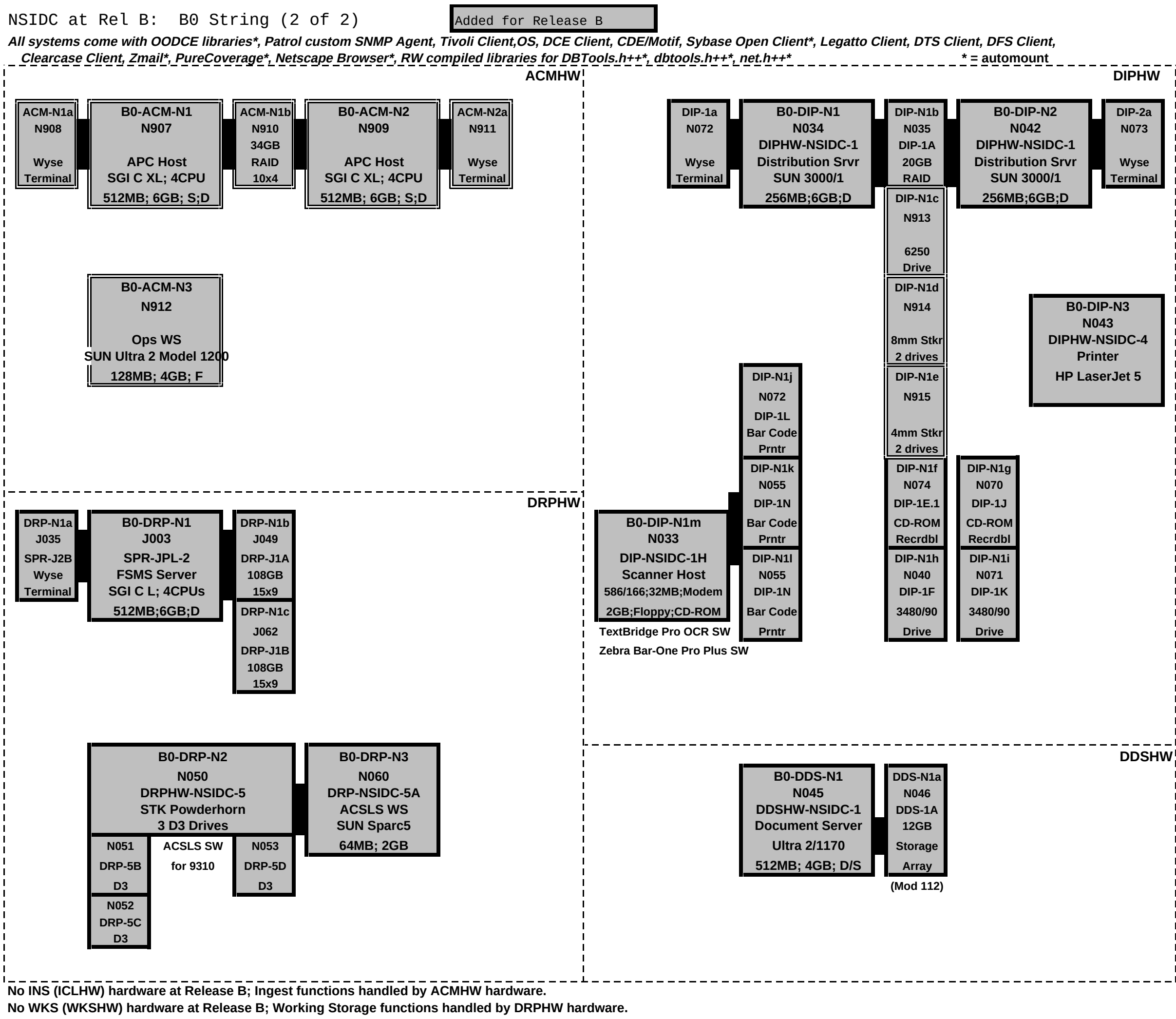

Figure 5.4-1. NSIDC B.0 Hardware Configuration (cont.)

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
1	**NSIDC DAAC ACTIVITIES**	2/24	10/19
2			
3	**T:Testbed Installation and Operation**		
4	T:Install Testbed Hardware-NSIDC	5/2	5/12
5	T:Install Testbed Software-NSIDC	5/13	6/3
6	T:Testbed Operational-NSIDC	6/2	4/3
7	T:Terminate Testbed	4/3	4/3
8			
9	**B.0:Prepare and Install Site Configuration**		
10	B.0:Procure,test,ship HW-NSIDC	1/2	5/5
11	B.0:Install HW and LAN-NSIDC	5/6	7/16
12	B.0:Install and Configure COTS SW - NSIDC	7/24	10/2
13	B.0:Install and Configure Custom SW - NSIDC	10/3	10/31
14			
15	B.0:Deliver DID 603 - Operational Readiness Plan		10/20
16	B.0:Deliver DID 611 - Mission Operations Procedures		10/20
17	B.0:Deliver DID 625 - Training Material		10/20
18	B.0:Perform Preliminary Training - NSIDC	10/14	10/16
19			
20	**B.0:Verification Testing-N/A**	7/1	
21			
22	**B.0: Acceptance Testing**		
23	B.0:**Perform Acceptance Test Dry Runs	10/15	11/12
24	B.0:CSR	10/31	10/31
25	B.0:Perform Acceptance Testing	11/3	12/23
26			
27	B.0:Deliver DID 526 - Standard Repair Procedures		12/3
28	B.0:Deliver DID 618 - Replacement Part List & Spare Parts List		12/17
29	B.0:Deliver DID 619 - Test & Support Equip. Reqt's List		12/17
30	B.0:Deliver DID 626 - M&O Certification Plan		12/17
31	B.0:RRR	12/30	12/30
32			
33	**B.0:Operational Readiness**		
34	B.0:Perform Operational Readiness Activities	12/30	2/3
35	B.0:Conduct M&O Classroom Training - NSIDC (Release B.0)	1/16	2/12
36	B.0 ORR - TBD	2/3	2/3
37			
38	**B.0:Add Second HW Buy**		
39	B.0:Install AMASS, CPU - TBD		10/3
40			
41	**B.0:Testbed to B.0 Migration**		
42	B.0:Prepare for Testbed-B.0 Transition	1/2	3/20
43	B.0:Transition to B.0	3/23	4/10
44	B.0:Terminate Testbed	4/3	4/3
45			
46	**B.0:SSI&T**		
47	Mode Managed Test and Training	2/3	9/28
48			
49	**B.1 Verification Testing - N/A**		
50	B.1:Deliver DID 603 - Operational Readiness Plan	6/17	6/17
51	B.1:Deliver DID 611 - Mission Operation	6/17	6/17
52	B.1:Deliver DID 625 - Training Material	6/17	6/17
53			
54	**B.1:Acceptance Tests**		
55	B.1:Dry Run Acceptance Tests	4/17	5/12
56	B.1:CSR	7/1	7/1
57	B.1:Perform Acceptance Tests	7/1	8/25
58			
59	B.1:Deliver DID 526 - Standard Repair	9/16	9/16
60	B.1:Deliver DID 618 - Replacement Part	9/30	9/30
61	B.1:Deliver DID 619 - Test & Support Equipment	9/30	9/30
62	B.1:Deliver DID 626 - M&O Certification Plan	9/30	9/30
63	B.1:RRR	9/1	9/1
64			
65	**B.1:Operational Readiness**		
66	B.1:Perform Operational Readiness Activities-TBD	9/1	10/1
67	B.1:Conduct M&O Classroom Training	10/20	10/23

Timeline: 96 J A S O N D · 1997 J F M A M J J A S O N D · 1998 J F M A M J J A S O N D · J

Thu 3/27/97 5:23 PM — NSIDC:Page 1 — Transition Plan

Figure 5.4-2. NSIDC DAAC Transition Timeframe Activities

Dates as of 2/17/97 Schedule

ID	Task Name	Dates
68	B.1:ORR-TBD	10/1 – 10/1
69		
70	**B.1:Transition from Release B.0 to B.1**	
71	B.1:Prepare for Release B.0 to B.1	10/14 – 12/2
72	B.1:Transition from Release B.0 to B.1	12/24
73	B.1:Terminate B.0 Operations	1/6 – 1/

Thu 3/27/97 5:52 PM NSIDC:Page 2 Transition Plan

Figure 5.4-2. NSIDC DAAC Transition Timeframe Activities (cont.)

5.5 JPL ECS DAAC

The JPL DAAC concentrates on ocean circulation and air-sea interaction. They will receive no new launch data from AM-1 satellites, but will do V0 data migration in the Release B.1 time frame before they begin ingesting data from Radar ALT and ADEOS II Seawinds products after the August 1999 launches.

Because JPL is a new ECS installation for B.1, it may have a special role to play in the transition. For example JPL might support cross-DAAC testing with the mini-DAAC at Hughes in Landover.

The JPL B.1 site hardware configuration is shown in Figure 5.5-1 pages 1 and 2. This configuration will be installed in May, 1998. The *Release B JPL Facility Plan* (302-CD-007-001) has been published and the installation plan publication is scheduled for publication in Spring 1998.

The schedule for activities at JPL in the transition timeframe is shown in Figure 5.5-2.

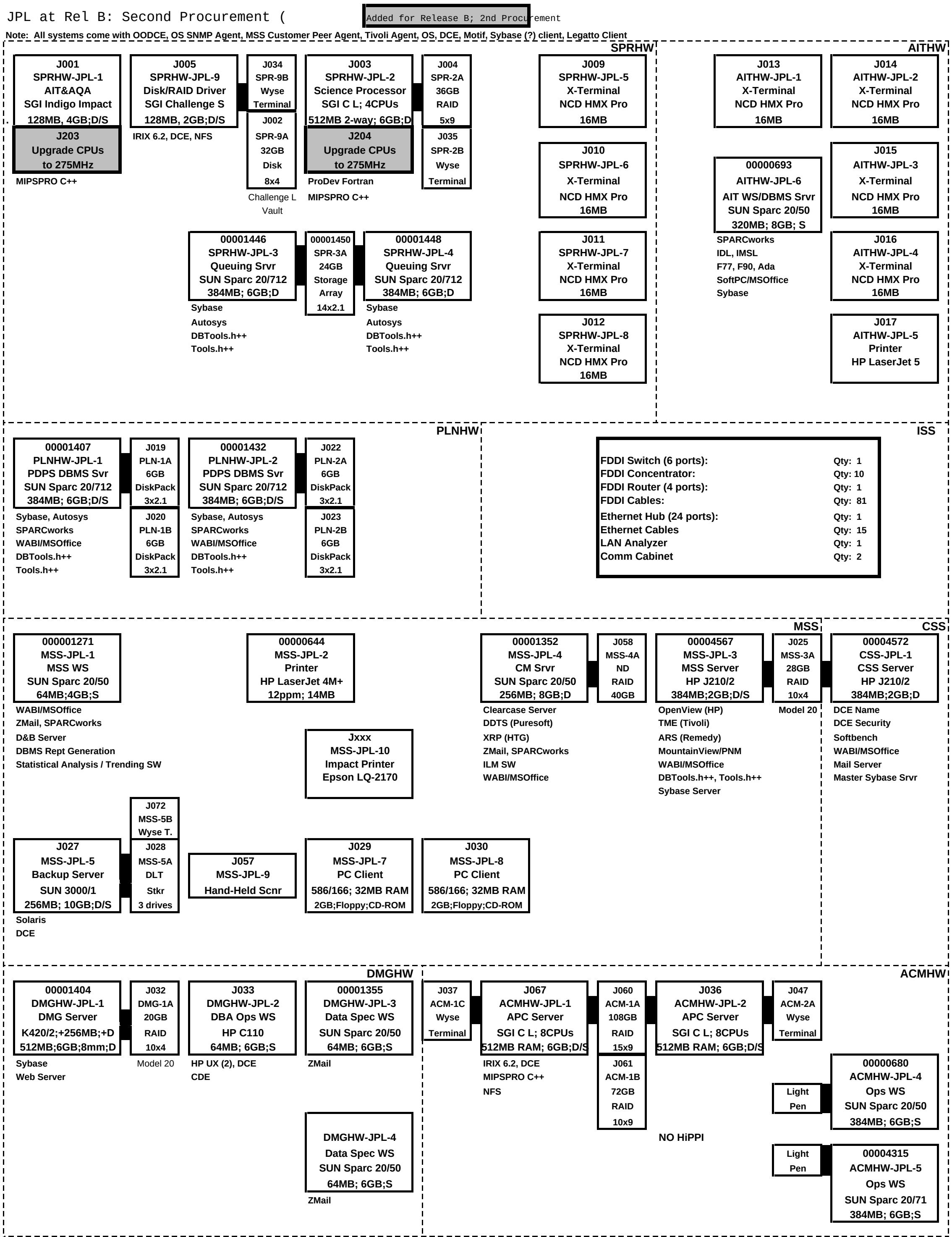

Figure 5.5-1. JPL B.1 Hardware Configuration

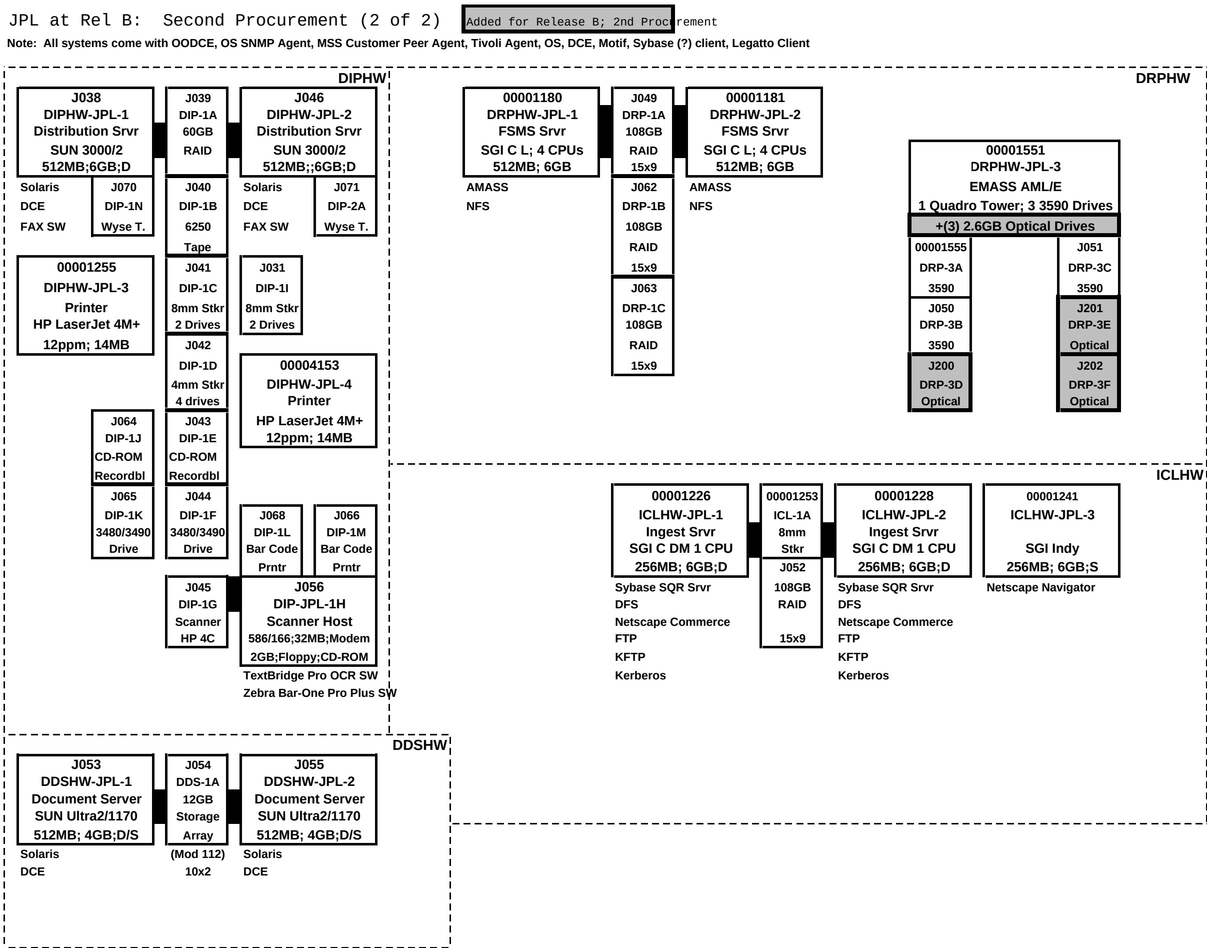

Figure 5.5-1. JPL B.1 Hardware Configuration (cont.)

Dates as of 2/17/97 Schedule

ID	Task Name	96 / 1997 / 1998
1	**JPL DAAC ACTIVITIES**	1/2
2		
3	**B.1:Prepare and Install Site Configuration-JPL**	
4	B.1:Deliver Installation Plan	2/12 2/12
5	B.1:Procure,test,ship HW-JPL	1/2 5/2
6	B.1:Install HW and LAN-JPL	5/4 6/9
7	B.1:Install and Configure COTS SW - JPL	6/3 6/16
8	B.1:Install and Configure Custom SW - JPL	6/17 6/30
9		
10	B.1:Deliver DID 603 - Operational Readiness Plan	6/17
11	B.1:Deliver DID 611 - Mission Operations Procedures	6/17
12	B.1:Deliver DID 625 - Training Material	6/17
13	B.1:Perform Preliminary Training - JPL	6/16 6/18
14		
15	**B.1 Verification Testing - N/A**	7/1
16		
17	**B.1:Acceptance Tests**	
18	B.1:Dry Run Acceptance Tests	4/17 5/12
19	B.1:CSR	7/1 7/1
20	B.1:Perform Acceptance Tests	7/1 8/25
21		
22	B.1:Deliver DID 526 - Standard Repair	9/16 9/16
23	B.1:Deliver DID 618 - Replacement Part	9/30 9/30
24	B.1:Deliver DID 619 - Test & Support Equipment	9/30 9/30
25	B.1:Deliver DID 626 - M&O Certification Plan	9/30 9/30
26	B.1:RRR	9/1 9/1
27		
28	**B.1:Operational Readiness**	
29	B.1:Perform Operational Readiness Activities-TBD	9/1 10/1
30	B.1:Conduct M&O Classroom Training - JPL	10/20 11/3
31	B.1:ORR-TBD	10/1 10/1
32		
33	**B.1:Transition from Release B.0 to B.1**	
34	B.1:Prepare for Release B.0 to B.1	10/14 12/
35	B.1:Transition from Release B.0 to B.1	12/24
36	B.1:Terminate B.0 Operations	1/6 1

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Figure 5.5-2. JPL DAAC Transition Timeframe Activities

5.6 ORNL ECS DAAC

The ORNL DAAC emphasizes biogeochemical dynamics. They will use ECS to provide access to their existing archive, migrating selected V0 metadata to ECS. Their existing systems will remain in place.

The ORNL B.1 site hardware configuration is shown in Figure 5.6-1. This configuration will be installed in May, 1998. The ORNL Installation Plan is scheduled for publication in Spring 1998. The ORNL ECS DAAC does not include production capabilities and will use storage capabilities already present at ORNL. Therefore, the configuration includes hardware and COTS software for the following HWCIs only: MSS, CSS, ISS, DMGHW, ACMHW, DDSHW, and DRPHW. The Ingest software is hosted by the ACMHW CI at ORNL.

Transition to Release B.1 is expected to provide minimal impact at ORNL because ECS is an addition to the existing system. ORNL will continue to support users on existing systems, and ECS will provide new capabilities for users to access the data. ECS will provide access to the ORNL archive, via metadata which will be migrated to ECS from the V0 system. Once in operation, ECS will also receive metadata for new products.

ORNL is responsible for creating interfaces from its existing systems to ECS.

The schedule for activities at ORNL in the transition timeframe is shown in Figure 5.6-2.

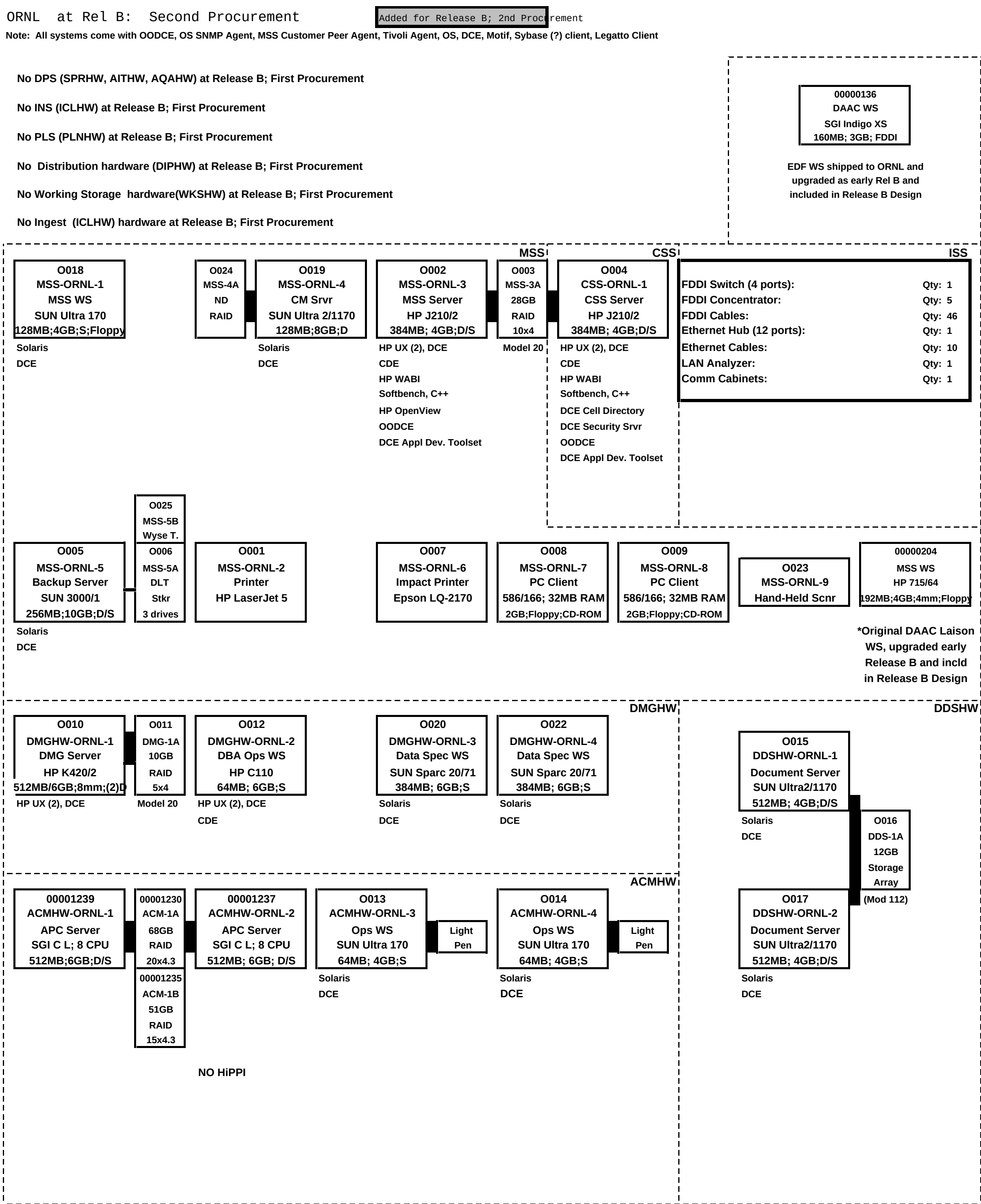

Figure 5.6-1. ORNL B.1 Hardware Configuration

Dates as of 2/17/97 Schedule

ID	Task Name	Start	Finish
1	**ORNL DAAC ACTIVITIES**	1/2	
2			
3	**B.1:Prepare and Install Site Configuration-ORNL**		
4	B.1:Deliver Installation Plan	2/12	2/12
5	B.1:Procure,test,ship HW-ORNL	1/2	5/14
6	B.1:Install HW and LAN-ORNL	5/4	6/22
7	B.1:Install and Configure COTS SW - ORNL	6/3	6/12
8	B.1:Install and Configure Custom SW - ORNL	6/17	6/30
9			
10	B.1:Deliver DID 603 - Operational Readiness Plan		6/17
11	B.1:Deliver DID 611 - Mission Opr. Procedures		6/17
12	B.1:Deliver DID 625 - Training Material		6/17
13			
14	B.1 Verification Testing - N/A	7/1	
15			
16	**B.1:Acceptance Tests**		
17	B.1:Dry Run Acceptance Tests	4/17	5/12
18	B.1:CSR	7/1	7/1
19	B.1:Perform Acceptance Tests	7/1	8/25
20			
21	B.1:Deliver DID 526 - Standard Repair	9/16	9/16
22	B.1:Deliver DID 618 - Replacement Part	9/30	9/30
23	B.1:Deliver DID 619 - Test & Support Equipment	9/30	9/30
24	B.1:Deliver DID 626 - M&O Certification Plan	9/30	9/30
25	B.1:RRR	9/1	9/1
26			
27	**B.1:Operational Readiness**		
28	B.1:Local Staff Opr. Readiness Activities-TBD	9/1	10/1
29	B.1:Local ORR-TBD	10/1	10/1
30			
31	**B.1:Transition from Release B.0 to B.1**		
32	B.1:Prepare for Release B.0 to B.1	10/14	12/2
33	B.1:Transition from Release B.0 to B.1	12/24	
34	B.1:Terminate B.0 Operations	1/6	1/
35			
36			
37	NOTE - ORNL will not have ECS M&O staff	7/1	
38	Opr Readiness activities not ECS supported	7/1	
39	Local site must make plans	7/1	

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Figure 5.6-2. ORNL DAAC Transition Timeframe Activities

5.7 ASF ECS DAAC

Current plans indicate the ASF DAAC will not receive Release B during the timeframes discussed in this paper.

5.8 ECS SMC

The ECS System Monitoring And Coordination (SMC) Center, located at GSFC, coordinates and monitors the configuration and performance of the ECS enterprise at all DAACs. It comprises the MSS, CSS, and ISS subsystems. The SMC B.0 site hardware configuration is shown in figure 5.8-1.

The SMC's role is to coordinate policy issues among the DAACs, provide user registration information, toolkit information, and monitor the overall health of the ECS. SMC functions include enterprise management, enterprise communications, and bulletin board services. As the recipient of performance data, processing status and scheduling data, the SMC staff supports schedule adjudication, cross-DAAC schedule coordination, and DAAC resource planning activities.

The SMC has a special role in transition, in so far as it must support both releases when the DAACs are testing one release while the other is in operation. For the interfaces between the SMC and the DAACs, this support will be accomplished via mode management. For other interfaces (Ebnet, EOS Operations Center(EOC), and so on) it will be necessary to use other means (such as off-hours usage) since non-ECS systems do not support mode management. The following overview of interfaces is given to indicate where parallel release support will be needed.

5.8.1 SMC External Interfaces

The SMC will interface with multiple external organizations and to each ECS DAAC. For details, the reader is referred to DID 305 in addition to the various Interface Control Documents (ICDs). The following briefly describes the external entities, including those identified to support interface testing:

• Release B DAACs - SMC will interface with the GSFC, LaRC, EDC, JPL, ORNL, and NSIDC DAACs. Policy information, originating from the ESDIS project office, system and network performance and management summary data, and user registration data will be exchanged between the SMC and the Local System Management (LSM) element at each DAAC.

• EOSDIS Backbone Network (EBnet) - The EBnet is the primary interface between the SMC, DAACs, EDOS, other ECS assets, and non-ECS elements. The SMC interface with the EBnet is to monitor and exchange status information between the EBnet and ECS.

• EOC - The SMC interface with EOC, at Release B is via the LSM at EOC. This interface is used to monitor and exchange status, performance summary and management information between the EOC and the SMC.

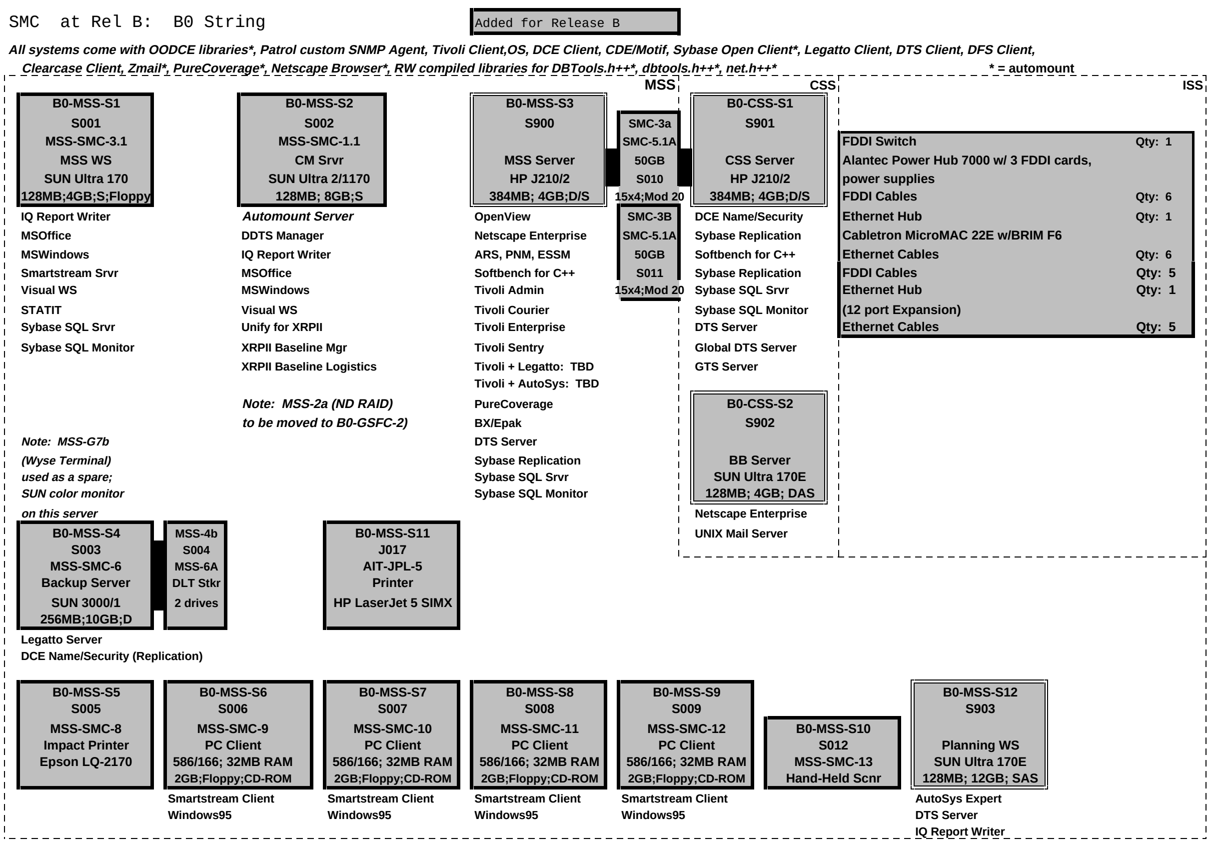

Figure 5.8-1. SMC B.0 Hardware Configuration

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6. Subsystem-Specific Issues

This section contains details for each subsystem of how the subsystem will address transition issues, namely:

- Data content and schema changes in each release
- Database migrations (to new COTS software product versions, or to new COTS software products, or to new hardware)
- Backward compatibility issues
- Changes in hardware and COTS software.

The Release B subsystems are Client (CLS), Management Services (MSS), Planning (PLS), Data Processing (DPS), Interoperability (IOS), Data Server (DSS), Data Management (DMS), Communications And Infrastructure (CSS), Data Ingest (INS), and Internetworking (ISS). The issues discussed emphasize the B.0 to B.1 transition since no major testbed to B.0 transition issues arose in the analysis.

6.1 Client Subsystem (CLS)

The Client Subsystem for Release B will be entirely web-based, except for the X/Motif-based Pre-Release B V0 client and the Data Acquisition Request (DAR) capability. This V0 client has been upgraded for the Release B environment, and is called the B0 Search And Order Tool (B0SOT). Users will be encouraged to install the Release B web client, called JEST (Java Earth Science Tool). An initial version of the Release B web Client will be delivered just-in-time for B.0 (it is not required for most B.0 acceptance tests), with the full version delivered with B.1.

The Client subsystem contains the Desktop and Workbench CSCIs.

The Client Subsystem is not present in the testbed Release, so the only transition to consider is from B.0 to B.1. When the B.1 Release is operational, users will be made aware that they can upgrade to the new B.1 Client. Indeed, because the B.1 Client is Java-based, download is continuous and upgrades could be made without involving the user: however there is no intention to do so at the present time.

The B0SOT (the X/Motif-based V0 client) will continue to be supported for the life of the V0 system.

6.1.1 Brief Summary Of Changes

A new release of JEST will be supplied for B.1.

6.1.2 Assumptions And Dependencies

It is assumed that a Sun Ultra server will be provided to host the Client CSCI web server in B.0, and that it will not be upgraded in B.1.

6.1.3 Data Changes

Science users can save granule URs (Universal References - the standard handle for an ECS granule or an ECS service) on the desktop as files. DAAC users may be able to save other kinds of data. Further study of the desktop is needed to identify all kinds of data that can be stored in order to identify where future releases have to provide backward compatibility but in the case of URs, from Release B onward, backward compatibility will be provided. To enable future releases to recognize old UR formats, a version number is included within URs. Note that URs generated by the testbed are not a compatible format and will not be recognized by Release B.

6.1.4 Hardware Changes

There are no Client hardware changes from B.0 to B.1.

6.1.5 COTS And Custom Code Changes

There are no Client subsystem COTS software changes between B.0 and B.1.

During the lifetime of Release B a user running X/Motif-based tools (i.e. DAAC operators, and science users who are remotely accessing DAAC operator interfaces) may access ECS from a workstation running X11R6 and/or Motif 2.0 (perhaps because she/he has upgraded to an operating system which does not offer earlier versions). The Release B baseline is X11R5 and Motif 1.2. X11R6 is known to be backward compatible with R5; Motif 2.0 compatibility with Release B is to be determined.

6.2 Management Services Subsystem (MSS)

The Management Services Subsystem contains the Management Agents, Management Logistics, and Management Software CSCIs, and the Management Hardware HWCI.

6.2.1 Brief Summary Of Changes from B.0 to B.1

The changes from Release B.0 to Release B.1 are the addition of the Billing and Accounting Service, an expanded request tracking capability, and expanded report generation capabilities.

6.2.2 Assumptions And Dependencies

There are currently no assumptions or dependencies for the transition from Release B.0 to Release B.1.

6.2.3 Data Changes

There will be significant schema changes from Release B.0 to Release B.1 to support the addition of enhanced Report Generation capabilities and the Billing and Accounting Service functionality.

6.2.4 Hardware Changes

There are no planned hardware changes for Release B.1.

6.2.5 COTS And Custom Code Changes

1. Interfaces from MSS to clients will change due to billing and accounting, and due to production events capability being added to end-to-end request tracking.
2. MSS Performance Management: The COTS Statistics package for trending will require additional custom code.
3. MSS Fault Management: Configure TIVOLI (from Release B.0) to perform fault correlation.
4. MSS Accountability: Request tracking. Add small number of attributes to existing class objects.
5. The Report Writer COTS will require additional custom code.

6.3 Infrastructure Design Group (IDG)

The Infrastructure Design Group comprises the Communications And Infrastructure Subsystem (CSS) which contains the Distributed Computing CSCI and the Distributed Communications HWCI and miscellaneous infrastructure components including the UR capability, the Server Request Framework, and the Managed Process Framework.

6.3.1 Brief Summary Of Changes

Release B.0 will have the following capabilities, many of them enhancements from the testbed. There are minor enhancements for B.1, but none of them are expected to affect transition.

1. ASTER communications gateway (security, DAR and DPR support, and DCE cell-to-cell interface).
2. Distributed object framework upgrades, including a namespace class to incorporate the Release B.0 namespace architecture (which is a major change from the testbed), changes to the Process Framework (PF) to incorporate namespace class functionality, and support for the Distributed File System (DFS).

3. The Release B.0 Name Service uses the modified PF which uses the namespace class to export binding information to the server side of the Cell Directory Service(CDS) namespace. The client side of the CDS namespace includes the server group name. The Group names and Server principals are administratively created. The applications advertise their binding information in the CDS per managed objects in the CDS namespace.

4. The CDS Name Service has a client and a server view. The server view is mode independent and the client view is mode based and is static in nature. The client uses the group name on the client side to connect to the server of interest. See figure A.1 ECS CDS Directory Structure.

5. The following list describes B.0 DCE capabilities:

   - Serviceability Improvements - enhanced diagnostic messages. A new document, the *DCE Problem Determination Guide*, provides explanation and action to be taken for every DCE error code.
   - Cell Aliasing - enables cell names to be changed.
   - Hierarchical cells - enables cells to be organized to match the hierarchical structure of an organization.
   - Security Delegation - allows intermediary servers to operate on behalf of the initiating client across chained RPC operations.
   - Extended Login Capabilities - includes password management, pre-authentication, and access only from trusted machines.
   - Performance improvements - including optimized RPC calls.
   - Changes to the Name Space class to accommodate dual-named hosts in the DAAC configuration.

6.3.2 Assumptions and Dependencies

It is assumed that the DCE cell configuration is the same for B.0 and B.1.

6.3.3 Data Changes

The name server and security server databases will be distributed among the sites when the Release B.0 multicell topology is established, whereas in the testbed the name server and security server maintained single databases for all sites.

6.3.4 Hardware Upgrades

The only change to the CSS server for B.0 is the addition of 20GB to the RAID shared with the MSS server.

6.3.5 COTS Upgrades/Changes

None.

6.4 Planning Subsystem (PLS)

The Planning subsystem comprises the Production Planning (PLANG) CSCI and the Planning Hardware HWCI. The following describes the transition of the Planning Subsystem from B.0 to B.1.

6.4.1 Brief Summary Of Changes

There are several new capabilities available in the B.1 Release of the Planning Subsystem Software.

There will be support for On-Demand Production Requests. This includes a new interface with DSS so DSS can send production requests to Planning. It is a new CSC, and a new process will exist to handle DSS requests.

Resource Planning enhancements will allow resources to be allocated to more than one activity.

Reprocessing Request support; this will require modifications to the Production Request Editor, and changes to the user interface.

Inter-DAAC Planning will allow DAACs to base their production plans on data availability schedules received from other DAACs. The Production Planning GUI will be updated to facilitate this activity. Another capability of the Planning CI will be to create estimated EDOS data availability schedules from FOS data.

The Landsat Processing Ground System (LPGS) will be supported. ECS will supply the LPGS with Landsat-7 L0R data and will receive back L1G and L1R data.

6.4.2 Assumptions and Dependencies

Since PLS and DPS share the PDPS database as a communication mechanism, both will require the same database version and schema. Therefore PLS and DPS must both be from the same Release (B.0 or B.1) at any given DAAC.

Additionally, DSS should also be from the same release as PLS and DPS. These subsystems are tightly coupled in data production and their smooth interaction could be jeopardized by seemingly insignificant differences.

6.4.3 Data Changes

A script will be run to convert the PDPS database from Release B.0 data into Release B.1 data format. Note that while this script will handle most schema changes in an automated fashion, it is likely that there will be some schema changes which will necessitate manual editing of data during the transition. Naturally, ECS will endeavor to keep such changes to a minimum.

6.4.4 Hardware Upgrades

None.

6.4.5 COTS Upgrades/Changes

None.

6.4.6 Interoperability of B.0 and B.1 Components

As noted in section 6.4.2, PLS and DPS software share a common database. It is highly unlikely that PLS and DPS components from different Releases will operate properly together. Since even minor schema changes can cause unexpected results if B.0 and B.1 components access the same database, it is extremely risky to attempt this.

Interactions between PLS and other subsystems (other than DPS) from different releases are much more likely to succeed. This is because there will be minimal changes in public interfaces in B.1 and all interfaces in B.1 are designed to be backward compatible. However, until B.1 is complete, there can be no guarantee that B.0 PLS will operate properly with other B.1 subsystems or that B.1 PLS will operate with other subsystems from Release B.0.

6.5 Processing Subsystem (DPS)

The Processing Subsystem comprises the Processing, Science Data Processing Toolkit, and Algorithm Integration And Test CSCIs, and the Science Processing, Algorithm Integration And Test, and Algorithm Quality Assurance HWCIs. The following describes the transition of the Processing Subsystem from B.0 to B.1.

6.5.1 Brief Summary Of Changes

Predictive Staging. Some data may be staged before the specific PGEs are ready to execute to improve throughput of the system. This involves new fields in the PDPS database which will indicate if a PGE is to have its data predictively staged.

Reducing the number of jobs in the job box. For Release B.0, the Production Monitor will see (for each PGE) eight jobs on the AutoXpert display. In Release B that number is reduced to 4. This will mean that when Release B.1 is operating the Production Monitor will be able to actively watch fewer jobs through the AutoXpert displays and AutoSys will be able to process more PGEs/day.

6.5.2 Assumptions and Dependencies

Since PLS and DPS share the PDPS database as a communication mechanism, both will require the same database version and schema. Therefore PLS and DPS must both be from the same Release (B.0 or B.1) at any given DAAC.

Additionally, DSS should also be from the same release as PLS and DPS. These subsystems are tightly coupled in data production and there smooth interaction could be jeopardized by seemingly insignificant differences.

6.5.3 Data Changes

See section 6.4.3

6.5.4 Hardware Upgrades

Although there are additions to the Science Processing Hardware in the second procurement of Release B hardware, these additions are not synchronized with the B.1 software release. Any science processing machines that are added to the configuration need to be defined to both PLS and DPS so that they can be scheduled and utilized while processing science algorithms.

6.5.5 COTS Upgrades/Changes

None.

6.5.6 Interoperability of B.0 and B.1 Components

As noted in section 6.5.2, PLS and DPS software share a common database. It is highly unlikely that PLS and DPS components from different Releases will operate properly together. Since even minor schema changes can cause unexpected results if B.0 and B.1 components access the same database, it is extremely risky to attempt this.

Interactions between DPS and other subsystems (other than PLS) from different releases are much more likely to succeed. This is because there will be minimal changes in public interfaces in B.1 and all interfaces in B.1 are designed to be backwardly compatible. However, until B.1 is complete, there can be no guarantee that B.0 DPS will operate properly with other B.1 subsystems or that B.1 DPS will operate with other subsystems from Release B.0.

6.6 Interoperability Subsystem (IOS)

The Interoperability Subsystem contains the Advertising Service CSCI and the Advertising Service HWCI.

6.6.1 Brief Summary Of Changes

The Interoperability Subsystem (IOS) consists of one CSCI, the Advertising Service (ADSRV), which has two primary CSCs, the Advertising HTTP server and the Advertising Application Server. The HTTP server is COTS. The ADSRV software runs on the DMS (Data Management Subsystem) hardware CI, so at Release B.0 the ADSRV HTTP server will be installed, configured, and started on the DMS hardware CI.

There are two primary functional capabilities added by Release B.0. These are:

1. Support for subscriptions on the insertion, deletion, and update of advertisements. The ADSRV will notify the subscription server of these events and the subscription server will process the subscription.

2. Integration with the Data Dictionary Service (DDICT) of the DMS to provide definitions of the terms in the advertising service. This integration will occur in the ADSRV application run from the HTTP server and it will call up the DDICT web interface serviced by the same HTTP server.

6.6.2 Assumptions and Dependencies

1. HTTP server COTS selection will be the same from Release B.0 to B.1, Netscape Enterprise Server.

2. The ADSRV will share the Sybase SQL server and Replication Server installation with the DMS. Therefore, it will follow the same release versions as the DMS, Sybase 11.

6.6.3 Data Changes

The Release B.1 ADSRV database will primarily be of the same structure as the Release B.0 database. Any minor modifications will be accomplished through SQL scripts. The SQL scripts will initially create the Release B.1 database. Next the data will be copied from the Release B.0 database using a second set of SQL scripts. The Release B.1 SQL server will be a trusted server of the Release B.0 SQL server, so data can be exchanged through this mechanism.

6.6.4 Hardware Upgrades

None of the hardware changes occurring with the Data Management hardware will affect the software installation or configuration of the ADSRV.

6.6.5 COTS Upgrades/Changes

B.0 and B.1 will use the same version of Sybase (11) so there are no COTS transition issues. The HTTP server, Netscape Enterprise Server, is also the same in B.0 and B.1.

6.6.6 Interoperability With Prior Release Components

The Advertising Service does not interface with other components other than the infrastructure Process Framework, Error and Event logging, and Universal References. Advertising Service interoperates with some components such as Ingest. At the B.0 and B.1 timeframes, these interfaces may change, so the appropriate subsystems will be required to change. The infrastructure migration from B.0 and B.1 will mostly be a relinking of the application and changes to the configuration files. There will be some changes to the Advertising Service public interface such that subsystems that interface to the Advertising Service will have to upgrade their code. From the B.0 to the B.1 release, there will be minimal public interface change, but the assumption is that at least a relink will be required.

6.7 Data Server Subsystem (DSS)

The Data Server Subsystem contains the Science Data Server (SDSRV), Document Data Server (DDSRV), Storage Management (STMGT), and Data Distribution (DDIST) CSCIs, and the Access And Control Management, Working Storage, Data Repository, and Distribution And Ingest Peripheral Management HWCIs.

6.7.1 Brief Summary Of Changes

Science Data Server:

Science Data Server functions that will be available in the B.0 Release include:

1. Versioning
2. Production history
3. Browse, acquire, and insert
4. Landsat-7 subsetting
5. MODIS 1B subsetting, for PDPS only

Included in Release B.1 are all B.0 capabilities plus subsetting, accounting, and metadata problem reporting.

Document Data Server:

Possible migration of document metadata and keywords to DDSRV's Informix database, which may in turn affect the sizing for the DDSRV DBMS machine. In addition, management of DDSRV will be improved and more document formats, including PDF and RTF formats, will be supported.

Storage Management:

The additional capabilities of B.0 STMGT are as follows:

1. Distribution of compressed files and compression for remote inserts (although full system support for remote inserts is not delivered until B.1),
2. Logical deletion of files from archive,
3. GUI interfaces for storage management configuration parameters,
4. Device alarms,
5. Archive data backup and restore,
6. Operator reservation of devices.

The additional capabilities of B.1 are as follows:

1. Regeneration of lost files,
2. Restoration of lost files,
3. Physical file deletion from archive,
4. Statistical monitoring of checksum error rate,
5. Reporting of Disk Utilization Information,
6. Estimation of DSS Resource Utilization,
7. Quality control of distributed media,
8. Operator control of media archive criteria,
9. Automated refresh and recopy of files from the archive.

Storage management hardware changes start with the addition of working storage separate from the archive servers, with multiple servers used if necessary for storing the Interim Production only. The Browse Data Robotics Repository, using optical disk media, will be added at most installations. Media supported in Release B.0 will include D3, 3480 and 3490 tapes, and CPIO formatted tapes will be introduced in Release B.1. Electronic distribution and the Science Data Server CI will be co-located on the ACM hardware CI.

Data Distribution:

Release B includes the upgrade of the single software CSCI Data Distribution (DDIST). B.0 capabilities include distribution of 3480/3490 tapes and distribution via facsimile, as well as standard 4mm and 8mm tapes and CD-ROM. The additional B.1 capabilities are as follows:

1. Quality control checks,
2. Distribution request segmentation,
3. Automatic generation of media labels, automatic generation of shipping labels, and compression.
4. Cost estimating, and cost accounting,
5. The sending of alerts to the MSS when electronic transmission problems occur.

6.7.2 Assumptions And Dependencies

The selection of the SDSRV DBMS for B.1 is pending at the time of writing. A discussion of migration issues is provided below (6.7.3.1), on the assumption that there will be a change, ie. that Sybase 11 will not be selected.

6.7.3 Data Changes

The Release B data products are listed in the Data Types/Services matrix posted on the requirements home page (http://newsroom.hitc.com/rtm/rhp-rb10.html). "Data" covers product (files) data, metadata, and system infrastructure data. When science data is migrated we must maintain synchronization between the archives and the metadata, as well as system infrastructure data that will allow for continued location and retrieval.

The approach taken will minimize the effect of making URs obsolete. That is, if a client of data server has been given a UR, that UR should not be made obsolete by the migration of the data.

The STMGT server configuration tables (e.g., path names), device tables (path names, capacity, device information), and AMASS table (AMASS mount point) must be configured. This is a software installation activity. They can be configured using the new GUI interfaces provided in Release B.0. The STMGT error logs from the prior release will be stored when the new release becomes operational, but there is no operational or history data that must be ported from the prior release to the new release for either STMGT or DDIST.

6.7.3.1 Cross Release Migration

It is assumed here that an alternate DBMS is used for B.1, so a migration of the contents of the B.0 Sybase 11 DBMS is needed.

General Issues

In general, mapping between Sybase and the migrated database will have an effect on the generation of the initial load flat file as well as how the download files will be loaded into the B.0 or B.1 schema. The intent here is to make the mapping as complete as possible to prevent the loss of any data.

Schema mapping may determine how data must be extracted to best fit into the B.0 or B.1 schema. There may be an exact one-to-one mapping between tables within the two schemas or situations where the mapping is more complex. These situations may require the download files to be updated to add data values for new columns in the receiving schema. Other cases may require the download files to be loaded into work tables and custom SQL written to populate the B.0 or B.1 tables. Analysis and development tasks should be accounted for in the schedule.

Since this is the planning phase of this transition, there is still a decision to be made relative to what DBMS product will be implemented within the context of the B.1 and further releases for SDSRV metadata. At the time of the final selection, default plans will need to be completed.

The sites that will be transitioned from the Release B.0 to Release B.1 are the following DAAC sites: EDC, GSFC, LaRC, and NSIDC. An assumption is made here that the SDSRV software will be made available to the CIESIN SEDAC, but ECS will not commission the system there.

This transition plan will contain all necessary concepts and steps to perform the DBMS migration. All Science Data Server metadata from Release B.0 will be migrated to the yet to be selected DBMS for Release B.1. The transition plan makes the following assumptions about the migration:

A. Mode Management is available for this Release.

B. primary and cold spare platforms are identical relative to hardware and software, and have access to a full compliment of peripheral devices.

C. primary and cold spare platforms will be configured to their full specification or will have the available capacity to successfully process the transition at the time of the SDSRV DBMS data conversion.

D. primary and cold spare platforms will have full network access to one another.

E. There is (currently) no requirement to run the Release B.0 and B.1 Science Data Server DBMS servers in parallel.

F. The cold spare server can be used to host the B.0 DBMS during migration.

G. Assumptions not met will require a separate plan to reduce risk of that item.

The transition plan will exercise one of the following two options:

1. Mode Management services

2. Replacement of primary platform with the backup.

Option One

The first option in the B.0 to B.1 transition to be discussed will be relative to the functionality provided by Mode Management services. Through the use of Mode Managed resources all of the B.0 to B.1 transition procedures can take place on a single platform. Provided that the B.1 environment is completely built and tested this will assist in the success of this transition.

The assessment of the risks of this option brings various potential problems to light. First, there is the potential problem of available CPU and memory resources. Machine resources may not perform adequately during the conversion period, when the resources will be effectively split between the two server environments running simultaneously. Sufficient physical resources must exist (CPU and memory) so that neither server runs in a significantly degraded manner. There must be sufficient disk resources to host both servers and operate effectively. Another risk is that a second environment with new COTS and hardware could potentially effect platform downtime due to installation and configuration. Separate implementation plans that may be required are another risk.

An assessment of B.0 disk usage must be done to ensure that enough disk space remains to build the B.1 database prior to the transition. Insufficient resources could force the use of option two.

The major benefit of this option is having the cold spare remain available for its intended purpose, which is to serve as back-up platform for the primary. Also, this approach makes it easier to move data from between environments on the same platform rather than from an environment on another platform.

Option Two

The second option of this transition involves the active use of the cold spare. Using this approach, the B.1 environment is built and tested using the cold spare machine. At some point there is a conversion to the B.1 environment on the cold spare when deemed necessary. This will make the old primary platform available as a cold spare once the system is verified.

Access of a readily available backup platform is the major risk of exercising this option to migrate from Release B.0 to B.1

Benefits from this option are as long as the primary is stable there is no need for a spare and the systems can be run in parallel if necessary.

6.7.4 Hardware Upgrades

For Release B.0, the SDSRV host is an APC server, along with other ECS applications. The sizing for this SGI server varies by site; for GSFC it is configured as a 14 CPU (195 MHz R10000s), 1GB RAM machine. It will run Irix 6.2 with Sybase 11.x. The hardware does not change for B.1, but the DBMS for B.1 is to be determined.

The STMGT CI host platform is an SGI in Release B.0. We are migrating from 3590 to D3 tape drives, and adding 3480 and 3490 drives. Facsimile, label printing hardware, and optical disk are added. The archive will be upgraded at some sites.

6.7.5 COTS Upgrades/Changes

The DBMS may change from Sybase 11 to Informix Universal Server between B.0 and B.1.

6.8 Data Management Subsystem (DMS)

The Data Management Subsystem contains the Local Information Manager (LIMGR), Distributed Information Manager (DIMGR), Data Dictionary (DDICT), V0 Interoperability Gateway (GTWAY), and ASTER Catalog Interoperability Gateway (ASTGW) CSCIs, and the Data Management HWCI.

6.8.1 Brief Summary of Changes

All DMS CSCIs are new in Release B.0. The capabilities of these new CSCIs are as follows:

1. The Data Dictionary Service (DDICT) is a CSCI that provides definitions of data collections, their attributes, domain values of attributes, and mapping of attributes and values to collection specific terms. This CSCI is used by the Data Server as a repository for a conceptual schema of the holdings of the Data Server. The Client Subsystem submits search requests to DDICT on behalf of user requests and for configuring the user interfaces. The DDICT database is used by the LIMGR, DIMGR, and GTWAY CSCIs to describe the schemas accessible through these components. The database is stored in Sybase and changes are replicated to each DAAC using the Sybase Replication Server.

2. The Local Information Manager (LIMGR) is a CSCI that provides access to the services of a site including service requests to the GTWAY, SDSRV, and DDSRV. The LIMGR reads the DDICT database directly through a class library (RogueWave DBtools) that interacts directly with Sybase.

3. The Distributed Information Manager (DIMGR) is a CSCI that provides access to the services across sites including service requests to the LIMGR, GTWAY, and SDSRV. The DIMGR reads the DDICT database through the DBtools library just as the LIMGR does.

4. The V0 Gateway (GTWAY) is a CSCI that provides interoperability between V1 (Release B.0) and the V0 System. In Release B.0, two-way interoperability will be supported: from V0 to V1 and from V1 to V0. In addition, the V0 Gateway will support all the mode management and event capturing requirements of Release B.0.
5. The ASTER Catalog Interoperability Gateway (ASTGW) is a CSCI that provides two-way interoperability between the ASTER GDS (Ground Data System) and ECS. Each direction is a separate Unix process.

Each of the CSCIs in the DMS provide mode management capabilities as well as event logging consistent with Release B requirements. The LIMGR, DIMGR, ASTGW, and GTWAY CSCIs all access services in the DSS, using the Release B DSS interface.

At Release B.0, each DAAC will have one K200 server with 2 CPUs and additional RAM. This provides comparable performance while decreasing the cost of two server machines at each DAAC.

6.8.2 Assumptions and Dependencies

None

6.8.3 Data Changes

The DDICT database schema will be implemented at B.0 and used by the V0 Gateway (from V0 to ECS). There will be some schema changes occurring in B.1 to support requirements such as geographic name search. In B.1 a new DDICT database will have to be established. The B.0 database will be copied to this new structure as part of the upgrade. The B.1 CSCIs will use mode management to control the database that they connect to during testing of B.1.

6.8.4 Hardware Upgrades

None

6.8.5 COTS Upgrades/Changes

There are no issues with the upgrades of COTS.

6.9 Data Ingest Subsystem (INS)

The Ingest Subsystem contains the Ingest Services CSCI and the Ingest Client HWCI. The Ingest Subsystem is not part of the Testbed.

6.9.1 Brief Summary of Changes

Release B.0 includes the upgrade of the single software CSCI (INGST). The additional capabilities are as follows:

1. The INGST CSCI provides the capability to control (hold, resume, and change priority of) ongoing ingest requests. The CSCI includes the operator GUI capability to specify requests to be controlled and the action to be taken.
2. The INGST CSCI is restructured to fully distribute ingest request processing. In particular, a new Granule Preprocessing Manager program is deployed on each ECS processor on which ingest data preprocessing is performed.
3. The INGST CSCI adds table information describing Release B data types. The table information allows table-driven metadata extraction, data conversion, and data reformatting.
4. The INGST CSCI performs metadata preprocessing related to Release B data types.
5. The INGST CSCI provides a GUI media ingest capability that provides access to new media types supplied at Release B. Specifically, D3 tape media is provided by ASTER at the EDC DAAC. Note: the media peripheral hardware and associated access software is provided by the DIPHW CI of the Data Server subsystem.
6. The MSS startup script is updated to automatically start polling ingest daemons for new ECS polling with delivery record interfaces (e.g., EDOS at LaRC and GSFC).
7. Completion messages are sent when ingest is complete.

Release B.0 includes the single hardware CI (ICLHW). The capabilities are as follows:

1. The B.0 system at LaRC has a primary/backup pair of SGI Challenge L processors and RAID. The RAID storage is used for combined SDPF/EDOS working storage.
2. Hardware equivalent to that at the LaRC DAAC is installed at the GSFC DAAC to support EDOS Level 0 ingest. That hardware includes an SGI Challenge L pair, and RAID similar in capacity to the LaRC DAAC.
3. Hardware equivalent to that at the LaRC DAAC is installed at the EDC DAAC to support Landsat 7 L0R ingest. That hardware includes an SGI Challenge L pair, and RAID similar in capacity to the LaRC DAAC.

Release B.1 adds barcode, ADEOS, and RADAR ALT support.

6.9.2 Assumptions and Dependencies

The MSS User Profile is updated in Release B.0 to contain external data provider information.

The CSS Ingest Gateway (TCP/IP-to-OODCE gateway) for Release B.0 must be configured to invoke the Release B.0 version of the Ingest Server, and similarly for B.1.

6.9.3 Data Changes

The polling configuration tables must be configured to operational values, which is a software installation activity. History data should be dumped before starting the new release.

6.9.4 Hardware Upgrades

The hardware upgrades at the sites have no effect on the software. Software to access and control new archive tape libraries is provided by the Data Server subsystem. Software to access and control new media peripheral hardware is provided by the Data Server subsystem.

6.9.5 COTS Upgrades/Changes

Ingest HTML forms continue to access the Document Data Server HTTP server at Release B.0. It is assumed that there will be no impact to existing HTML forms nor associated script files.

6.9.6 Test Aspects

The approach to providing test data inputs to is to record incoming data and replay it at a future time.

6.10 Internetworking Subsystem (ISS)

The Release B Internetworking Subsystem (ISS) contains one CSCI, the Internetworking CSCI. This CSCI provides networking services based on protocols and standards corresponding to the lower four layers of the Open Systems Interconnection (OSI) reference model: the transport layer’s TCP and UDP protocols; the network layer’s IP protocol; and the physical/data link layers’ Ethernet, FDDI, and HiPPI protocols.

The ISS also contains one HWCI that provides the networking hardware for the intra-DAAC, DAAC to V0, DAAC to EBnet, SMC, and EOC connectivity, including: FDDI switches, concentrators and cabling, Ethernet/FDDI routers, hubs and cabling, HiPPI switches and cabling, and network test equipment.

6.10.1 Brief Summary of Changes

A Pre-Release B Testbed (Testbed) network and a Release B.0 network will be concurrently operational at each of four ECS DAAC sites - GSFC, LaRC, EDC, and NSIDC - at the time that the transition effort from Testbed to Release B is to take place.

The network installations are such that network resources (ECS routers, hubs, concentrators, FDDI switches, etc.) are not shared between Testbed and Release B.0. The exceptions are the ECS and EBnet routers at EDC and NSIDC that provide wide area network connectivity to both Testbed and Release B.0 networks through separate interfaces. Wide area network connections to the Internet is through the campus's exchange network and the ECS router; inter-DAAC network connections is through the EBnet router.

Network addressing has been assigned in order to permit concurrent operation.

Transitioning from the Testbed to the Release B.0 network infrastructure on a site-by-site basis is accomplished by de-commissioning the Testbed network. That is, removing the Testbed's wide area network connections and network infrastructure hardware.

The installed Release B .0 network is designed and sized to support both Release B.0 and Release B.1. Therefore, no transitioning effort associated with Release B.0 to Release B.1 is required.

6.10.2 Assumptions and Dependencies

6.10.2.1 Assumptions

The following assumptions apply for the ISS network transitioning:

- EBnet will provide the required connections to support concurrent operation of the Testbed and Release B networks at each of the four sites.
- Network routing protocol - RIP is retained for Release B.0 intra-DAAC network routing. This assumption is the basis for the EBnet routing dependency below.
- Network traffic - Increases in campus exchange LAN and EBnet WAN data flows resulting from concurrent operation of Testbed and Release B.0 networks will not adversely impact these networks.
- With respect to user access to the four Testbed networks through the campus exchange LAN and the Internet, the security requirements will be a downgraded version of the requirements specified for Release A at GSFC and LaRC: rlogin, telnet, NFS, NIS, and X-11 traffic will be prohibited; ftp and ktelnet will be permitted.
- With respect to EBnet connectivity to the four Testbed networks, the security policy enforced by EBnet connections for the Release A will be continued for the Testbed connections. Further, only inter-Testbed and bi-directional connections from the Testbeds to the GSFC Release B.0 and Testbed SMCs will be permitted through EBnet.
- Access to Release B.0 production networks from Testbed networks will be disallowed. Changes to this policy will be on an exception basis and implemented by filter changes on the Release B FDDI switch/router. Access to the Release B.0 Ingest network from Testbed networks will be permitted through the EBnet routers.

- By default, network connectivity between Testbeds and any of the Release B.0 networks will be allowed (with the exception stated above regarding the production networks).

6.10.2.2 Dependencies

The following dependencies apply for the ISS network transitioning:

- EBnet WAN:

  1. EBnet provides for concurrent Testbed and Release B.0 network connectivity at the four sites - GSFC, LaRC, EDC, and NSIDC.
  2. EBnet will provide the appropriate route advertisement and traffic filtering to accomplish the assumptions stated above.
  3. EBnet will support the transition from Testbed to Release B.0 by making the appropriate changes to the EBnet router configurations at the four sites.

6.10.3 Data Changes

(Not applicable to the ISS Subsystem's transition.)

6.10.4 Hardware Changes

Although not specifically hardware changes, the transition effort between Testbed and Release B.0 does require changes to the network routers' configuration setup - specifically the shutdown of Testbed interfaces and removal/changes of traffic filters. Both changes can be accomplished while the network hardware remains operational.

6.10.5 COTS Upgrades/Changes

(Not applicable to the ISS Subsystem's transition.)

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Appendix A. Mode Management Primer

Mode management enables ECS Maintenance and Operations (M&O) Staff to perform testing and/or training activities while production activities continue uninterrupted. Each unique activity that requires process and data separation is classified as a mode. Mode management enables the execution of multiple modes, such that each mode functions without interfering with the other modes and each mode maintains data integrity throughout it's execution.

The mode management design does not limit the number of concurrently executing modes, however, performance considerations need to be addressed prior to the initiation of an additional mode.   The design will support multiple test and training mode instances, but due to concurrent data access and data preservation issues there can only be one operational mode of execution at any given time.

Mode management is the capability of running multiple versions of parts or all of the system software at the same time on the same hardware. Software components will be duplicated, and hardware resources will be isolated whenever possible, to support an additional mode. However, there are shared resources, both hardware and software, that require special consideration to enable mode management support. There are two predefined modes: SHARED, for these special shared software elements, and OPS for operational system use. Other modes for test and training can be added to the system, via configuration without any changes to source code, and there is no fixed limit to the number of modes that can be configured. The ability to monitor and control modes is built into the MSS management framework (HP Openview and the management agents), so that operators at the Local System Management (LSM) console can view the resources available in each mode.

A.1. Process And Data Connections

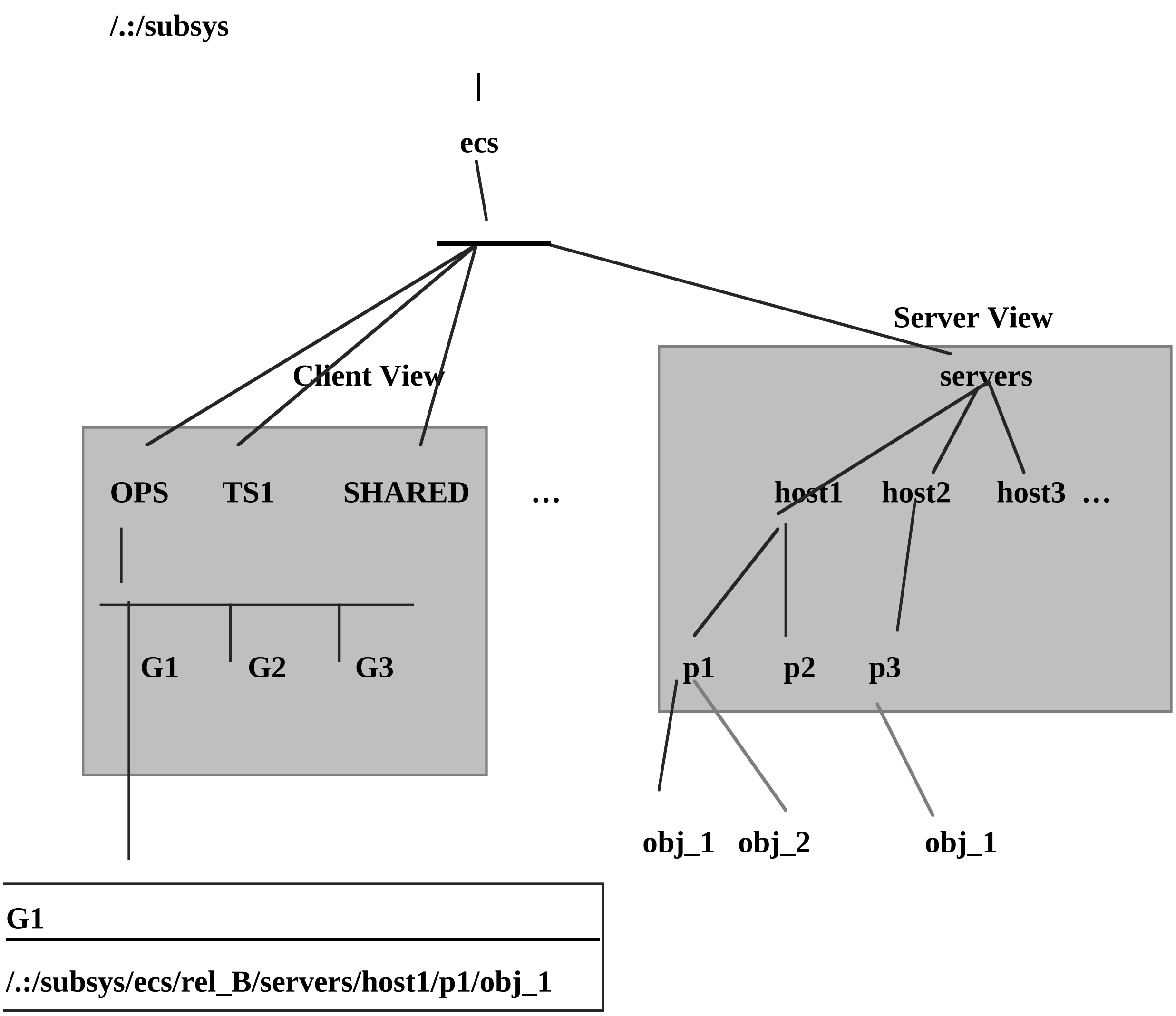
Mode management is achieved by executing a copy of the system processes and databases for each mode. Processes connect to other processes, data, and other resources. Each mode's copies of processes and data are distinguished by ECS naming conventions. The integrity of the connections is enforced via *connection classes* that are used by all applications to bind to a resource. The connection classes allow the application code to be unaware of mode management: an application simply requests a connection, and the connection class makes sure that the connection is to the appropriate resource for the mode. Additional safeguards are in place to make sure that non-OPS modes never gain write access to OPS databases (non-OPS applications use separate database accounts, so that access privileges can be set appropriately). The key connection classes are described below, together with a brief description of the resource to which they control access.

Connection Classes

A.1.1 The Namespace Class

The Namespace class encapulates the DCE cell directory service. In the ECS design, the cell directory itself is partitioned into a client side and a server side. On the client side, a subtree is provided for each mode - OPS, TS1, and SHARED modes are shown in figure A.1. Clients running in a particular mode access the subtree corresponding to that mode to bind to a server. Servers register on the server side, and links are established to the server side from all the client subtrees that are using the server.

This class enforces the "process distinction" property of mode management. Clients running in a given mode will bind only with servers that are appropriate for that mode.



Where: G1, G2, G3 are the CDS group names. Group names must be unique within a mode of operation.
P1, P2 .. are the unique principal names(application name) for each instance of a server.
Administrators create the mode specific CDS directories in CDS on client side of the tree.
Administrators create host specific directories on server side of the CDS tree.
"SHARED" is a shared mode. The administrator will add a shared group entry to each application group which accesses shared objects.

A.1.2 The Database Connections Class

The database connections class is a common component which allocates connections to clients needing access to a database. Typically, clients specify their database list in the Process Framework (PF) configuration file. The names in this database list are root names, to which the connections class appends the mode identifier at run time (the mode identifier is passed to each process as a command line argument at startup). The ECS database naming convention is that mode is appended to the root database name, unless the mode is OPS (production). For example, the OPS version of the MSS database is called simply mss_db, while the version for mode TS1 would be called mss_db_TS1, and so on.

This class enforces the “data distinction” property of mode management. Clients running in a given mode can connect only to databases that are appropriate for that mode. However, because setting up physical copies of databases in support of multiple modes could be time-consuming and might exceed the resources available, the PF configuration file allows an alias for a database to be specified, so that a database can be used by more than one mode. The connection class protects OPS databases against write access from a non-OPS mode via this aliasing scheme by appending “_NOTOPS” to the username when a user in a non-OPS mode connects to an OPS database. It is essential that the M&O database owners do not grant write access to OPS database accounts for NOTOPS users.

A.1.3 The Process Framework Classes

The ECS Process Framework (PF) supports mode management in several ways. When the management agent starts a process, it supplies the mode identifier as a command line argument. The PF reads the mode identifier and makes it available to all PF client code. The PF also encapsulates access to the ECS operational directory structure. All resources (files, data, executables, COTS, documents, and so on) that are accessed via the ECS operational directory structure are partitioned by mode. The root pathname used for ECS files is "/usr/ecs/mode/". The Process Framework provides a method PfMakeAbsPath() which prefixes this root to a relative path. All Release B code uses this method whenever a file or directory name is created.

Below /usr/ecs/mode/, all subdirectories are replicated for each mode, so that all aspects of the system (custom code, COTS, config files, data files, ...) can vary by mode. Any files or directories that are not specific to the mode would be either absent (for example, a test mode for PDPS might not contain code for some other subsystems), or would be symbolic links to another mode's files or directories (for example, a mode might use the OPS version of a COTS product).

Since the content of OPS mode will change from time to time, such as when B.0 transitions to B.1, /usr/ecs/OPS will be a softlink to the directory that contains the current production release.

For each mode the directory is subdivided into "CUSTOM/" and "COTS/". The COTS directory is reserved for the installation of COTS software and COTS related files. It is divided into subdirectories by product (indicated by *(sybase), ((tivoli)...)*.

The CUSTOM directory is reserved for ECS custom developed items, including software and data. It is divided into subdirectories according to purpose, and some of these subdirectories are further divided by subsystem, as indicated in Figure A.2. The term "*(subsystem)"* in Figure A.2 indicates a list of subdirectories named according to the subsystem identifiers (e.g., CSS, MSS, CLS, etc.).

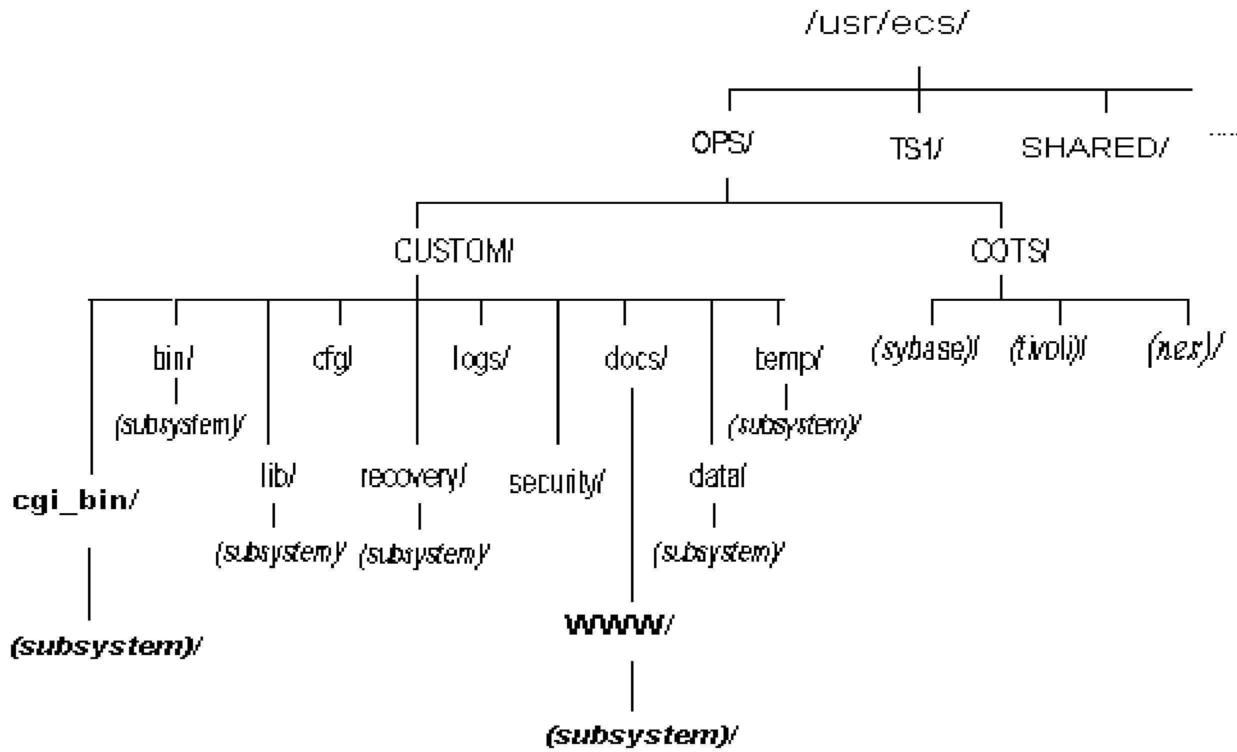


Figure A-2. Unix Directory Structure For Release B

A.2. Shared Components

ECS components can be designed to support mode management in one of two ways:

- *mode-specific:* mode-specific components run as multiple copies, one copy in support of each mode.
- *shared:* shared components are designed to run as a single copy supporting all active modes. These components use a special pre-defined mode called SHARED. These components are usually part of the infrastructure.

An example of a shared component is the Management Agent. There is a single management framework for monitoring and controlling all modes, from HP OpenView at the LSM out to each platform, with a single agent on every platform to start processes in whatever mode is commanded by the LSM, and then to report status on all modes from the platform. Modes can be monitored individually from the single copy of OpenView, since the mode identifier is contained in all status reports to the LSM.

To the maximum extent possible, ECS software is made mode-specific rather than shared. There are two reasons for discouraging shared code:

1. Mode-specific code can be run in multiple copies, so test and training versions can be run in parallel with production.
2. Shared code, because there is only one copy, offers a single API to all modes. Therefore new releases of ECS must provide backward compatibility with all shared interfaces, or must patch previous releases to bring them up to the new interface.

Shared software components are typically part of the infrastructure. They include:

1. Operating Systems, DCE, and the namespace class
2. The management framework, including Tivoli, HP Openview, SNMP, and the agents
3. Various online COTS products, including:
    - security COTS (Kerberos, and so on)
    - license managers

A.3. Configuration Of A Mode

B.0 will be delivered with the pre-defined modes OPS and SHARED, plus at least one configured mode already set up as an example. An unlimited number of additional modes can be configured into the system. The following list specifies the things to consider when setting up a mode.

A.3.1. Performance and RMA impacts

The first consideration is the hardware resources that the mode will use. Although modes can be run in parallel on the same hardware, usually it is better to make use of the redundancy built into the system in order to minimize performance and RMA impacts. For example, a trouble ticket for the Science Data Server could be worked by using the warm spare APC server to run a copy of the Science Data Server in a test mode.

The people that execute the mode have the responsibility of ensuring that the activity supported by the mode does not absorb undue amounts of shared resources (network bandwidth, CPU cycles, memory, and so on). They must also ensure that the software executing in the mode is mature enough that the chance of a failure affecting a shared resource is slim.

A.3.2 Drivers And Stubs

If the entire system is executing in some mode, and external systems such as EDOS are not part of the mode, then drivers and stubs must be placed at the system boundaries to supply input data flows and capture all output data flows. If only part of the system is executing in some mode, then drivers and stubs are needed to replace the missing parts of the system if they are involved in any threads of execution. For example, a test mode for Ingest might use a driver instead of an external interface, and a stub instead of Data Server.

A.3.3 Configuration

1. Databases: Either database copies must be physically created, and named in accordance with the convention of appending the mode to the database name, or aliases must be set up to allow another mode’s databases to be used. If creating a copy, it may not be necessary to copy all records. The mechanism for setting up an alias is described above under the Database Connections Class. If OPS databases are aliased, accounts for NOTOPS users must be established without granting write access.

2. Cell Directory Service Namespace: A branch for the mode must be set up in the DCE Cell Directory (see figure A.1 ECS CDS Directory Structure). When clients and servers are started in the mode, they will seek out the branch and bind to each other.

3. Mode Control Scripts: Optionally, startup and shutdown scripts for the mode can be written to avoid having to bring up and down all components of the mode manually at the LSM.

4. Unix Filesystem: A directory for the mode must be created under /usr/ecs on all machines that will participate when the mode executes. See figure A.2 Unix Directory Structure For Release B. Under the /usr/ecs/<MODE> directory, all subdirectories used by the mode must be populated. However, softlinks can be set up so that one mode can use COTS products, for example, from a different mode. All the executables, scripts, libraries, configuration files, COTS products, and so on, that are to be used by the mode must be placed in the subdirectories under /usr/ecs/<MODE>.

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Abbreviations and Acronyms

ADEOS-II	Advanced Earth Observing System II
ADSRV	Advertising service CSCI
AHWGP	Ad Hoc Working Group for Production
AI&T	Algorithm Integration and Test
AM-1	EOS AM Mission spacecraft 1, -- ASTER, CERES, MISR, MODIS, and MOPITT
AMASS	Archival management and storage system
APC	Access/Process Coordinators
API	Application program interface
ARS	Action Request System
AS	Administration Stations
ASCII	American Standard Code for Information Interchange
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
ATL	Automatic Tape Library
ATM	Asynchronous Transmission Mode
CD-ROM	Compact Disk - Read Only Memory
CDRL	Contract Data Requirements List
CD-ROM	Compact disk - read only memory
CDR	Critical Design Review
CDS	Cell Directory Service
CERES	Clouds and Earth's Radiant Energy System
CGI	Common Gateway Interface
CI	Configuration Item
CIESIN	Consortium for International Earth Science Information Network
CLS	Client Subsystems

CORBA	Common Object Request Broker Architecture
COTS	Commercial off-the Shelf
CPU	you should know this one
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
CSDT	Computer Science Data Type
CSMS	Communications and System Management Segment
CSR	Consent-To-Ship Review
CSS	Communications And Infrastructure Subsystem
CSS	Client Server Subsystem
DAAC	Distributed Active Archive Center
DADS	Data Archival And Distribution System
DAO	Data Assimilation Office
DAS	Data Assimilation System
DBA	Database administrator
DBMS	Database management system
DCE	Distributed computing environment
DDICT	Data dictionary CSCI
DDIST	Data distribution CSCI
DDSHW	Document Data Server HWCI
DDSRV	Document data server CSCI
DEV	Developed code
DID	Data Item Description
DLL	Dynamic Link Library
DMS	Data Management Subsystem
DPR	Data Processing Request
DPS	Data Processing Subsystem

DRPHW	Data Repository HWCI
DSS	Data Server Subsystem
ECS	EOSDIS Core System
EDF	ECS development facility
EDOS	EOS Data and Operations System
EDHS	ECS Data Handling System (Web site)
EGS	ECS Ground System
EOC	EOS Operations Center (ECS)
EOSDIS	Earth Observation System Data Information System
ESDIS	Earth Science Data and Information System (GSFC Code 505)
ESDT	Earth science data type
ESO	ECS Server Object
ESQL	Earth Science Query Language
FOS	Flight Operations Segment
FSMS	File Storage Management System
FTP	File transfer protocol
GDS	Global Directory Service
GSFC	Goddard Space Flight Center
GSO	Global Server Object
HP	Hewlett Packard
HTML	Hypertext markup language
HTTP	Hypertext transfer protocol
I&T	Integration and Testing
ICD	Interface Control Document
IMS	Information Management System
INGST	Ingest CI
INS	Ingest Subsystem

IOS	Interoperability Subsystem
ISS	Internetworking Subsystem
IT	Instrument Team
IUS	Informix Universal Server
JEST	Java Earth Science Tool
LSM	Local System Management
LUT	Lookup Table
M&O	Maintenance And Operations
MDA	Management Data Access
MIB	Management Information Base
MPF	Managed Process Framework
MMS	Mode Management Service
M-POP	Metadata Population
MSS	Management Services Subsystem
NASA	National Aeronautics and Space Administration
NFS	Network File System
NSI	NASA Science Internet
OODCE	Object Oriented DCE
OPS	Operations
ORR	Operations Readiness Review
OTS	Off-the-shelf
PCF	Process Control File
PDPS	Planning and Data Processing Subsystem
PDR	Preliminary Design Review
PF	Process Framework
PGE	Product Generation Executable
PGS	Product Generation System

PLS	Planning Subsystem
PRONG	Processing CI
RAID	Redundant array of inexpensive disks
RDA	Remote Data Access
RMA	Reliability, maintainability, availability
RPC	Remote Procedure Call
RRR	Release Readiness Review
SCF	Science Computing Facility
SDE	Science Data Engineering Office
SDP	Science Data Processing
SDPS	Science Data Processing Segment
SDSRV	Science Data Server CSCI
SEDAC	Socio-Economic Data and Applications Center (CIESIN)
SEO	Sustaining Engineering Office
SMC	System Monitoring and Coordination
SMP	Symmetric Multiprocessor
SNMP	Simple Network Management Protocol
SQS	Spatial Query Server
SSI&T	Science Software I&T
STMGT	Storage Management Software CSCI
TBD	To Be Determined
TRMM	Tropical Rainfall Measuring Mission
TSDIS	TRMM Science Data and Information System
UR	Universal Reference
URDB	User Registration DB
URL	Uniform Resource Locators
UUID	Universal Unique Identifier

VAT	Verification and Acceptance Testing
V0	The Version 0 ECS System
V1	Version 1: used to denote replacements for V0 components